HORTICULTURAL ABSTRACTS

Vol. 27, 1957

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THE COMMONWEALTH BUREAU OF HORTICULTURE AND PLANTATION CROPS

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Forthcoming Technical Communication

The typescript of T.C. 24 on the **Mulching of Vegetables** has just gone to press. In it the general theory of mulching as expressed in the Soil Bureau's T.C. 49—see p. iv of cover—is brought to earth and applied to particular crops, viz. the common vegetables.

The publication, which has been compiled in the bureau with considerable help from Overseas, should appear in the spring at a probable cost of £1.

Subject matter of Horticultural Abstracts

Horticultural and plantation crops and the application of science to their cultivation.

Under **horticultural crops** are included all whose products normally appear as fruits, vegetables, nuts or flowers, while all tropical and sub-tropical perennials, other than forest trees, such as tea, rubber, oil palm, sugar cane, etc., are classed as **plantation crops.** Tobacco, drug, insecticidal, spice and certain **other plants** difficult to classify are also dealt with.

The storage and preservation of these plants are covered only in so far as they are the direct concern of the grower. For details of processing see *Food Science Abstracts*, issued by the D.S.I.R. and obtainable from H.M.S.O., London, 12s. 10d. per number, annual subscription £4 including postage.

HORTICULTURAL ABSTRACTS

Vol. XXVII March 1957 No. 1

Initialled abstracts and reviews not by Bureau staff are by J. E. Crosse, R. J. Garner, R. V. Harris, E. S. J. Hatcher, D. H. Maggs, I. Modlibowska, H. B. S. Montgomery, and T. Walter of the East Malling Research Station, and by D. J. D. Nicholas of Long Ashton Research Station, R. H. Stoughton of Reading University, G. St.C. Feilden and J. R. Llewelyn.

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N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

EDITORIAL NOTES

NOTES OR BIBLIOGRAPHIES AVAILABLE

In 1956 110 readers asked for and received stencilled copies of bibliographies or notes listed in Horticultural Abstracts Vol. 26, No. 1, and 560 items were distributed in response to their requests.

Below are listed 44 similar stencils compiled in answer to enquiries in 1956. As before they will be available free to those interested so long as the supply lasts. Please note that not more than 1 copy of any 1 query can be sent to any given address. Recipients are at liberty to reproduce.

Interested readers should write direct to us [NOT to C.A.B., Farnham Royal] merely quoting the Query File No.

Query File No.	*Subject.*	*Information given.*
2913	Annotated bibliography on the **Effect of hormones on rooting of tea cuttings**	11 references
2915	Annotated bibliography on **Citrons (*Citrus medica*)**	26 references
2919	Abridged translation of Swedish article by Hintze in *Meddel. 92 från Statens Trädgardsförsök, Malmo*, 1955, on **Variety and rootstock trials with plums at Ranna, Sweden, 1939-54**	1 page
2920	Annotated bibliography on **Heat inactivation of viruses, especially in strawberries and raspberries**	14 references
2958	Bibliography on **Heat treatment of plants to inactivate viruses**	34 references
2927	Abridged translation of article by Seidel in *Dtsch. Gartenb.* Vol. 2, 1955, on **Instructions on the application of CO_2 to glasshouse crops**	2 pages
2929	Annotated bibliography on **Air layering (marcotting)**	46 references
2931	Annotated bibliography on **Frost resistance in tomatoes**	16 references
2936*	Note and bibliography on **Apple varieties and rootstocks for regions with mild winters**	4 pages + 8 references
2940	Annotated bibliography on **Hyacinth bulb propagation**	6 references

* =Q.F. 2558 revised.

Query File No.	*Subject.*	*Information given.*
3085	Abridged translation of article by Prihodjko in *Sad i Ogorod*, No. 4, 1956, on **Multiplying hyacinths from cuttings**	2 pages
2945	Notes and bibliography on **Late frost protection methods**	3 pages + 89 references
2957	Bibliography on the **Influence of molybdenum in the nutrition of fruit trees**	9 references (citrus, cacao and avocadoes)
2964	Annotated bibliography on **Plant injection for diagnosis and cure**	73 references
2966	Bibliography on **Hop biochemistry**	58 references
2972	Bibliography on **Grassing down of deciduous orchards**	25 references
2973	Bibliography on the **Effect of growth substances on apple maturity**	22 references
2976	Bibliography on **Descriptions of Peach varieties**	27 references
2978	Notes and bibliography on the **Composition and utilization of tobacco plant stalks**	Note + 10 references
2984	Bibliography on **Chemical thinning of apples and other fruit**	94 references
2985	Bibliography on **Hop diseases**	63 references
2986	Annotated bibliography on **The use of clover with or without grass as a cover crop in orchards**	21 references
2990	Tabulated notes on the **Correction of molybdenum deficiency in horticultural crops by the application of sodium or ammonium molybdates**	2 pages, including 28 references
2991	Notes and bibliography on **Chemical weed control in seed beds (mainly tobacco)**	2 pages + 20 references
3009	Bibliography on **Black pepper (*Piper nigrum*)**	60 references
3016	Note and bibliography on **Forcing *Prunus triloba* and lilac**	½ page + 6 references
3023	Annotated bibliography on **Street and roadside planting of trees, with special reference to tropical and sub-tropical conditions**	51 references
3024	Translation of article by Šneĭder in *Sad i Ogorod*, No. 10, 1955, on **A bacterial disease of stone fruits in the Krasnodar region**	1 page
3025	Annotated bibliography on the **Mulberry grown for sericulture**	53 references
3026	Annotated bibliography on the **Jonathan apple—characteristics and problems**	22 references
3031	Annotated bibliography on **Coriander and fennel**	25 references
3039	Bibliography on **Onion chemistry and varieties**	54 references
3061	Notes and annotated bibliography on the **Control of rhinoceros beetle of coconut**	5 pages + 35 references
3064	Annotated bibliography on the **Use of ovuli for the propagation of olives**	10 references
3071	Translation of article by Fedorjukov in *Sad i Ogorod*, No. 3, 1956, on **Raising tomato seedlings without frame sashes**	3 pages
3073	Annotated bibliography on **Growth in coffee and on methods of measuring and analysing it**	13 references
3074	Annotated bibliography on **Water relations of tomatoes**	26 references
3079	Notes and bibliography on **Pollen compatibility in cacao and methods of hand pollination**	4 pages + 11 references
3081*	Notes and bibliography on **Investigations (1945-1956) on non-parasitic disorders affecting tomato fruits**	5 pages + 49 references
3086	Annotated bibliography on **Olive rootstocks**	20 references
3087	Notes and bibliography on **Soil cultivation and sucker control in tobacco**	½ page + 12 references
3094	Translation of postscript to article by Schander in [*Publ.*] *Inst. Obstb. u. Baumsch. der techn. Hochschule Hannover*, 1956, pp. 57-61, on **Soil sickness in the orchard**	3 pages + 93 references
3117	Annotated bibliography on **Systems used to control the application of mist in glasshouses, propagation units and controlled environment chambers**	17 references
3120	Annotated bibliography on **Jackfruit and breadfruit**	40 references

* =Q.F. 2692 revised.

SALIENT ITEMS, Vol. 27, No. 1.

CENTRALIZATION

The news that all pomological research in Poland is to be directed from the new Institute at Skierniewice (69) prompts the thought that, whereas the planning of new research is being centralized in more and more countries, the problem of digesting and making sense of the results obtained is still largely left to the individual. Concurrently the ability of the individual to digest is shrinking as he becomes steadily more highly specialized. Have we now reached a stage when rather less planning and rather more assimilation would be helpful? Certainly the mass of largely unrelated data assembled in *H.A.* is all too indigestible, and it is but a small dyspepsia tablet that we offer in "Salient Items".

CLIMATIC FACTORS

Heat and cold:—Of five growth phases recognized in pears the first appears to be influenced by soil temperatures and the remainder by air temperatures (108). Some responses of fruit trees to temperature may, however, take a long time to show up (107, 764). Studies have been made on the temperature sums needed to ripen grapes and dates (198, 812) and on winter chilling responses of deciduous fruits and olives (109, 260, 819), and there are also numerous papers on the vernalization of annuals and biennials (notably in the Vegetable section). Among papers on frost attention may be drawn to differences in the depth to which soil may be frozen in clean-cultivated and grassed orchards (256), and to the remarkable claims made for a magnetic device for protecting orchards against frost and many other ills (259).

Sun and shade:—With tomatoes troubles caused by sunlight in summer can be reproduced by far-red radiation in winter (526), and with lettuce strong sunlight may reduce the carotene content (500). Young tea plants will tolerate more shade and higher humidity than older plants (938).

Water:—The date palm uses 3 times as much water during the summer as during the winter (808), and tomatoes growing under glass use nearly 70% more water per unit of dry matter than tomatoes growing in the open (552). With trees further evidence is presented that the rate of water extraction from soil is not affected until soil water falls below the permanent wilting percentage (149). In studies on the effects of waterlogging on tomatoes and tobacco a split root system technique was used (594).

Wind:—When apples are planted on exposed sites close spacing reduces the run of wind through the orchard, and this may increase yields per tree (156); alternatively yields may be increased by 32–160% by providing shelter belts (261). Tobacco also benefits from wind protection (603).

MACHINERY, EQUIPMENT AND METHODS

Machines and tools:—The learner-driver is catered for by cultivators and mowers with deflecting devices which come into operation when he hits a tree (153–155). Other items include a subsoiler with a fertilizer attachment (57), a rather fearsome-sounding motorized cutlass (58), a soil fumigant applicator (310), a sugar cane harvesting machine (930), a machine for removing the calyxes from strawberries (192), a macadamia nut husker (816) and two transplanting tools (872, 873).

Buildings and equipment:—A new phytotron built at Wageningen is described (50), as is a new moveable glasshouse (51), driers for copra and breadfruit (868, 869, 947), an improved essential-oil still (626), and a hot-air oven for treating sugar cane setts (909). A report is also presented on the heat saved by, and other effects of, a polythene liner in a glasshouse (52).

Apparatus and instruments:—In addition to the devices referred to in abstracts 61–65, attention is drawn to an apparatus for hydroponics research (41) and a guage for measuring the trunks of fruit trees (113).

Packing and storage:—Various aspects of packing, pre-cooling and storing apples and other deciduous fruits are dealt with in a series of papers (161–171). Vegetables are represented by two papers on the chilling of cucumbers (443, 444) and one on polythene bags for storing carrots (493). Citrus fruits can be wrapped in papers impregnated with a compound called Cequartyl B.E. or they may be distributed in 5 lb. polythene bags each perforated with 64 ¼-in. holes (801, 802).

PHYSIOLOGY AND BIOCHEMISTRY

Growth regulation:—The juvenile phase was not shortened by inducing cherry seedlings to complete two growth cycles per annum instead of one (106). Gibberellic acid continues to enhance plant growth, including that of physiological dwarfs (31, 111), and EDTA and sulphanilamide also possess growth-promoting properties (32, 925). Both 2,4-D and maleic hydrazide may, under some conditions, increase the sucrose content of sugar cane (923, 924), but whether this is caused by an increased rate of photosynthesis, as occurs when MH is applied to some other plants (36), remains to be seen. We wonder whether the world's statesmen would consider using their surplus bile to promote, not discord, but root growth (33).

Flower induction:—A method of studying induction in citrus and a hypothesis to explain the role of NAA in inducing flower formation in pineapples may be mentioned (769, 897).

Fruit thinning and drop, etc.:—In addition to a series of papers on deciduous tree fruits (120 *et seq.*) further attempts are being made to thin grape bunches with chemicals (235), and more information is available on the effects of 2,4-D and 2,4,5-T on citrus fruits (774, 775). On mangoes 2,4,5-TP affects fruit development and quality (885).

Leaf efficiency:—As determined in date palms (809).

Tissue culture:—A new method applied to isolated roots (38).

Biochemical highways and bye-ways:—Although the practical objectives, if any, of much biochemical research are apt to be shrouded in mystery, this cannot be said of one paper on the nitrogenous compounds in plant xylem sap (11) and another on the ability of roots to assimilate carbon dioxide (26). The discovery of a methylated aldopentose in nature (180) and information on the biosynthetic processes in fruits (178, 179, 194) may also conceivably lead somewhere some when!

Sex:—It is doubtful if even our youngest reader will be corrupted by studying papers on three distinct aspects of sex expression in cucurbits (439–441), or by the knowledge that hybridization between stone fruit species is facilitated when the oxidizing activity of the male parent is greater than that of the female (83).

NUTRITION

Plant composition:—First catch your hare, or in other words first discover reliable methods of cleaning, drying and analysing samples (8, 9, 136). Then decide what organs to analyse (248, 592, 755, 913, 914) and when to collect samples (138, 140, 215, 756), not forgetting to make allowances for such factors as locality, rainfall, cultural practices, nutrient supply, soil oxygen or rootstocks (137, 146, 214, 536, 539, 652, 874), and finally serve up a tasty dish of critical levels or nutrient balances (139, 217, 246, 422, 455, 460, 875, 891, 892, 902). Alternatively, try counting the calcium oxalate crystals (936).

Nutrition via roots:—In unworked fruit trees materials absorbed by one root are commonly translocated to a single branch, but this orientation may be destroyed by the presence of a graft union (132, 133). When the roots of two plants are intertangled water and nutrients may be transferred from one to the other (42).

Nutrition via bark and leaves:—Earlier findings that dormant apple trees could absorb nutrients through the bark have not been confirmed, but such absorption occurs through pruning wounds, cracks, etc. (134, 135). Current studies on foliar nutrition seem to be largely concerned with tropical crops (763, 843, 898, 918, 919, 937), but one paper on apples is of particular interest, showing that the time of day at which sprays are applied may markedly affect absorption (144).

Potash and oil content:—The partiality for potash of coconut and oil palms is well known (861, 862, 892). Cases are now reported in which the oil contents of pecan and tung kernels were positively related, at least in part, to K supply (238, 836). By contrast, in the case of essential oils the relationship may sometimes be negative (628).

Calcium:—The effects and curing of Ca deficiency in tomatoes are described in two papers (545, 546). With rhododendrons Ca toxicity is due to the Ca itself and not merely to high soil pH (740).

Boron:—The blue-fluorescent compounds found in necrotic areas in the leaves of B-deficient plants have been identified (404). Other aspects of B nutrition are dealt with in 142, 251, 544, 592, 642, 651 and 835.

Other minor elements:—High concentrations of heavy metals may suppress the formation of fibrous roots in citrus (761). The appearance of symptoms of chlorine deficiency in tomatoes may be delayed by supplying bromine (547). Other elements receiving attention include arsenic (849), cobalt (220, 458, 543), copper (760), iron (143, 247, 459, 511), molybdenum (145, 549) and zinc (543, 834).

PLANT PROTECTION

Losses caused by diseases and pests:—In cherries various viruses may reduce plant weights over 4 years by 15 to 57% (266). Red spider mites may reduce fruit size in apples during the year of attack, and in the year following reduce flowering by up to 75% and yields by up to 65% (312, 313).

Resistance:—In citrus resistance to scale insects is related to leaf composition (792). In broad beans resistance to the chocolate-spot fungus can be markedly increased by applications of the herbicide 2,4-D (466).

Virus transmission:—In tobacco inter-row cultivation at an early stage of growth may have little effect on the spread of mosaic, but when carried out only a fortnight later the effect may be marked (588). Further information is available on the transmission through soil of several raspberry viruses (268).

Chemicals:—Promising new acaricides include R.6199 (315, 316) and FW-293 (317, 677). There are various new antibiotics which show activity against fungi, one of which also appears to possess acaricidal properties (280, 462, 465). Telone is a new soil fumigant (797) and 3Y9 a new herbicide (389).

Spray residues:—The extent to which insecticides accumulate in soil and their consequent effect on future crops depends largely on the type of soil (411).

Some problems:—How to interpret the results, sometimes anomalous, of soil fumigation trials (702). How to explain why antibiotics may be more active at moderate concentrations than at higher or lower concentrations (605). How to link the finding that the elusive disorder of tobacco called frenching is due to a vanadium-sensitive soil factor with the various other factors previously held to be responsible for it (578).

PROPAGATION

Seeds:—Among several papers on the behaviour of seeds of fruit trees are two which show that germination may be upset by growth-substance sprays applied to control fruit drop (92, 885). Citrus seeds, normally short-lived, can be kept for several months in sealed polythene bags (750). Both biochemical and cytological changes occur in tobacco seeds during prolonged storage (597).

Cuttings:—Success in propagating deciduous fruit trees is claimed for a method in which root cuttings are first treated rather like layers (93). In hevea rubber seedlings adventitious shoots possess greater rooting ability than axillary shoots, an effect which is attributed to position rather than to a juvenility factor (901). Mention may also be made of studies on the origin and development of roots in cuttings of three ornamental plants (672) and on the effects of growth substances on shoot, root and callus formation in segments of two others (675). Finally, there is more information on the control and use of mist for striking cuttings (60, 91, 671, 683, 726) and on their storage after rooting (727).

Packing plants for shipment:—One snag is that what is meat for the shoots may be poison for the roots (687).

Rootstock effects:—The mechanism of rootstock effect is discussed in 4 papers (94–97), but perhaps on this occasion pride of place should be given to 2 papers, the one Russian, which refutes the possibility of vegetative hybridization resulting from normal grafting (28), and the other American, which proves that it can occur (692).

SURVEYS, SAMPLES AND STATISTICS

Surveys:—A curious assortment of information can be obtained from surveys. They may reveal, for example, the worth of the suburban gardener in Britain as a food producer (1), the reactions of apple trees to various soil factors in different areas (150–152) and the soil pathogens mainly responsible for poor asparagus yields in New Jersey (413).

Field trials:—A general discussion of problems of experimental design and technique with perennial crops (6) may be supplemented by an account of some difficulties in field experimentation with cacao in West Africa (857). Three methods of controlling the stand of onion plants in uniformity trials are also compared (478).

Samples and sums:—Two methods can be used to obtain growth curves of pear fruits (114). For apples a "pollination coefficient" has been worked out, which provides a basis for selecting pollinators for different varieties (115). For vines it seems that in future pruning may be regulated on a basis of potential fruitfulness as determined by the microscopical examination of a sample selection of buds (223). If you wish, you can also assess the amount of moss in your lawn (362).

MISCELLANEOUS

Climbing crops:—Types and heights of the supports provided may materially affect yields (621, 648).

Hard labour:—More time and motion studies (4) and the exhausting business of picking tomatoes (570).

Isaac Newton's apple:—The variety was Flower of Kent (86).

Sweet and sour:—On the one hand sugar sprays on plums to encourage bees (118), on the other cancerous neoplasms (474) and fission fall-outs (398, 939).

MISCELLANEOUS.

General.

(*See also* 66e, h, m, n, v, x, z, 67d, h, l, 958, 960, 970, 973, 983, 988-990, 993, 998, 1000-1002, 1003j.)

1. Best, R. H., and Ward, J. T.
Studies in rural land use. Report No. 2. The garden controversy.
[*Publ.*] *Dep. agric. Econ.*, *Wye Coll.*, *Univ. Lond.*, 1956, pp. 31, bibl. 18, 3s.

A critical analysis is made of the evidence and arguments involved in the controversy over the value of food produced from suburban areas in relation to the output from the farm land which they are replacing. A review of the relevant surveys shows that there is a lack of comprehensive and accurate information on the subject. Nevertheless several general conclusions are drawn: (1) The output from the urban areas forms an important part of the total supply of vegetables available in the country. (2) The value of the output from an "average" housing estate with only 14% of its area cultivated is roughly equal to that of the "better-than-average" farm land (the type of land most likely to be taken for development) when allowance is made for the saving in distribution costs; the figures are £42 per house-plot acre compared with £45 per acre of farm land. (3) the proportion of a garden which is cultivated tends to increase with decreasing housing density. It is concluded that a case for the tightening of residential density standards cannot be made solely on the grounds of conserving food production.

2. Shewell-Cooper, W. E.
Horticulture in Madeira.
Agriculture, *Lond.*, 1956, **63**: 327-30, illus.

Some aspects of horticulture in Madeira are briefly discussed. The chief commercial crops grown are bananas, grapes and sugar cane, but market-garden crops, such as potatoes, onions, tomatoes and haricot beans, are also produced.

3. Canada Department of Agriculture.
Experimental farm highlights in the Atlantic Provinces, 1955.
[*Publ.*] *Canada Dep. Agric. exp. Fms Serv.*, 1956, pp. 21.

A brief summary is given of results of current investigations at experimental farms in Prince Edward Island, New Brunswick, Nova Scotia and Newfoundland. Reports are included on: *Small fruits:* virus-free stocks of strawberries outyield regular stocks; soil fumigation against nematodes results in higher strawberry yields; hardy raspberry varieties; weed control in small lowbush blueberry nursery beds is obtained with Dowfume MC_2; complete fertilizers increase white clover competition in cranberry fields. *Tree fruits:* Antonovka is the most satisfactory winter-hardy stock; gas storage; rootstock trials; a new annual bearing, early apple seedling 27–32–52 has been produced; Clapps' Favorite is a satisfactory pollinator for Bartlett. *Vegetables:* Carrot quality is improved when crops are grown on ridged rows and pulled early; the tomato variety Bonita shows promise under Newfoundland conditions; trials of small squash varieties. *Ornamentals: Weigelia desboissii*; dahlia varieties.

4. Fjäderhane, A. M., and Arvidsson, L.
Arbetsstudier i trädgårdsodlingen. **(Time studies in horticulture.)** [List of contents in English.]
Medd. Alnarpsinst. trädgårdsekon. Byrån **25**, 1956, pp. 93, illus.

The latest publication in the series of time studies in horticulture, which are being carried out by the Bureau of Horticultural Economics, Alnarp, is again concerned with a large variety of operations common in glasshouse culture of flowers and vegetables. Some aspects of lawn management are also considered.

5. Brancker, A. V.
Solar energy—I. The water problem and its relation to solar energy.
Idem.—II. Solar power units and the future.
World Crops, 1956, **8**: 339-44, illus., and 398-400, bibl. 14, illus.

The author discusses the use of solar energy with particular reference to agriculture. Its use is of especial significance in the production of food in barren and abandoned areas where it may be used for demineralization of saline water, and for pumping water from wells and along irrigation canals. The role of solar energy in chlorella farming is also discussed.

Statistical design.

(*See also* 478.)

6. Pearce, S. C.
• **Some problems of experimental design and technique with perennial crops.**
Biometrics, 1956, **12**: 330-7.

In this paper, which was presented at the International Biometric Symposium, held at Campinas, Brazil, in July, 1955, the author discusses: (1) Problems in *scientific approach* arising from the comparatively small number of experiments that can be carried out over a reasonable period of time and the consequent need to make the best possible use of each. (2) Problems in *trial design and interpretation*, mostly mathematical, from which desirable developments in statistical techniques should arise. (3) Problems in the *variability and measurement* of plants, and the relations between various measurements.—E. Malling Res. Stat.

Air pollution.

7. Benedict, H. M., and Nielsen, J. P.
Leaf markings under air pollution.
Amer. Nurserym., 1956, **104**(8): 86-94.

The ways in which air-borne contaminants affect leaves are similar for all types of plants and depend on the nature of the contaminant. Descriptions are given of leaf marking patterns caused by chlorine dioxide, hydrogen fluoride, sulphur dioxide and smog.

Biochemistry.

8. Taylor, G. A.
The effectiveness of five cleaning procedures in the preparation of apple leaf samples for analysis.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 5-9, bibl. 11.

Wiping individual leaves with damp cheesecloth was superior to 3 other methods for removing iron contamination resulting from Fermate spray, whereas brief immersion in a detergent solution containing E.D.T.A. was better for removal of iron contamination not arising from spray. The latter treatment was also most effective for removing lead deposits. The other methods of cleaning were immersion in the same solution without E.D.T.A. and immersion and shaking in distilled water only.—Pa St. Univ., Univ. Park, Pa.

9. Smith, C. B.
The importance of dry weight losses in the preparation of leaf samples for analysis.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 10-15, bibl. 3.

The experimental material consisted of apple and peach leaves. Portions were subjected to 5 treatments including drying at 65, 100 or 30° C. [3 treatments], refrigerating for a week, then drying at 65° C., and mailing to the laboratory and then drying at 65° C. No treatment had a significant effect on the resultant nutrient-element content of the apple leaf samples, but varying treatments had varying results, noted here, on peach leaves.—Pa St. Univ., Univ. Park, Pa.

10. Anon.
Nuove analisi di ceneri vegetali. **(New analyses of plant ashes.)**
Ital. agric., 1956, **93**(9): iv.

Quantitative data are reproduced from *Terra pugliese*, 1956, No. 4, comprising percentages of CaO, MgO, K_2O, Na_2O, P_2O_5 and SO_3 in the ash of: leafy and non-leafy olive prunings, olive-pulp residue before and after hydrolysis, and olive stones; vine prunings, grape marc and seed residues; wood, husks and juice of almonds; stems and shoots of tobacco. The analyses were carried out with a view to utilization of these residues as manures.

11. Bollard, E. G.
Nitrogenous compounds in plant xylem sap.
Nature, 1956, **178**: 1189-90, bibl. 9.

The extension of a sap extraction technique described earlier [*H.A.*, 24: 1207] has made it possible to examine chromatographically the xylem saps from a wide range of woody and herbaceous dicotyledons, monocotyledons and gymnosperms. As was found in the tracheal sap of apple trees [*H.A.*, 23: 2608] nitrogen occurred largely in organic forms; nitrate was present in less than half the species examined and then usually only in trace amounts. In most species the dominant compound was asparagine or glutamine. Usually both these amides were present, as well as aspartic and glutamic acids and lesser quantities of alanine, serine, threonine, methionine and/or valine, leucine, and in some species, glycine, cystine and cysteic acid. Citrulline was present in species of 29 families and allantoin and/or allantoic acid in species of 23 families. The genera examined included various fruit and ornamental genera.—Fruit Res. Stat., D.S.I.R., Auckland.

12. Smillie, R. M.
Enzymic activities of sub-cellular particles from leaves. II. Centrifugal fractionation and characterization of particles in homogenates of etiolated pea leaves.
Aust. J. biol. Sci., 1956, **9**: 339-46, bibl. 19.

Homogenates of etiolated pea leaves were fractionated by differential centrifugation. The fractions were examined microscopically and were assayed for nitrogen, nucleic acid, and pigment content, for the following enzymes—succinoxidase, cytochrome oxidase, and cytochrome reductase, and for their ability to carry out oxidative phosphorylation. These studies revealed at least four different types of particles, namely nuclei, plastids, mitochondria, and particles of mitochondrial size, or smaller, lacking succinoxidase. These latter particles contained cytochrome reductase and corresponded to the microsomes of mammalian cells. [Author's summary.]—Dep. Biochem., Univ. Sydney. [For part I see *H.A.*, 26: 2373.]

13. Smillie, R. M.
Enzymic activities of sub-cellular particles from leaves. III. Centrifugal fractionation and characterization of particles in homogenates of green leaves.
Aust. J. biol. Sci., 1956, **9**: 347-54, bibl. 13.

Homogenates of green pea leaves have been fractionated by differential centrifugation. Six fractions so obtained were examined microscopically and assayed for total nitrogen, deoxyribo-, and ribonucleic acid, starch, and chlorophyll contents, succinic dehydrogenase, succinoxidase, α-ketoglutarate oxidase, cytochrome reductase, cytochrome oxidase, and their oxidative phosphorylation activity, and photolytic capacity. These studies revealed the presence of highly significant numbers of biochemically active mitochondria and smaller, non-oxidative particles containing cytochrome reductase. Both particle types were distinct from chloroplasts or chloroplast fragments. The enzyme distributions were almost identical with those found for etiolated leaves revealing a basic similarity between dark- and light-grown leaf cells. [Author's summary.]—Dep. Biochem., Univ. Sydney.

14. Kazarjan, V. O., and Avundžjan, É. S.
Enzyme activity in the leaves of trees of different ages and its alteration during vegetative propagation. [Russian.]
Doklady Akad. Nauk. S.S.S.R., 1956, **108**: 958-61, bibl. 15.

Analyses of similar leaves of young and old *Populus alba*, *Elaeagnus angustifolia* and *Salix alba* var. *pendula* have shown that the synthetic activity of enzymes in the leaves of young trees was much higher than in those of old trees. It was further found that the enzyme activity in leaves of rooted cuttings was higher than in leaves of the same branches of the old trees from which the cuttings were taken.

15. Crowdy, S. H., and Jones, D. R.
The translocation of sulphonamides in higher plants. I. Uptake and translocation in broad beans.
J. exp. Bot., 1956, **7**: 335-46, bibl. 15.

The uptake and translocation of sulphanilamide, sulphacetamide, sulphaguanidine, sulphapyridine, sulphadiazine, sulphathiazole, and 4:4-diaminodiphenylsulphone by broad bean plants growing in water culture has been studied. After varying times of exposure to the compounds at 100 μg./ml., total sulphonamide present in the roots, stems, and leaves was determined in acid-hydrolysed macerates by diazotization and coupling of the primary amino group. These compounds were identified in the leaves of treated plants by paper chromatography. Accumulation of sulphonamide in the roots appears to be related simply to time, and the concentration of sulphonamide may, eventually, be far higher than that in the treating solution. Movement from the roots to the stems and leaves depends on transpiration. Sulphanilamide and the sulphone passed rapidly into the leaves sulphacetamide, sulphapyridine, sulphadiazine, and sulphathiazole moved less rapidly. There was, however, a marked accumulation of sulphacetamide, sulphapyridine, sulphadiazine, sulphathiazole, and the sulphone in the roots. Sulphaguanidine was poorly absorbed from the treating solution. [Authors' summary.]—I.C.I. Ltd., Akers Res. Labs, Welwyn, Herts.

16. Crowdy, S. H., and Jones, D. R.
Partition of sulphonamides in plant roots: a factor in their translocation.
Nature, 1956, **178**: 1165-7, bibl. 7.

Previous studies using broad bean plants [see preceding abstract] have been extended by testing movements of two additional sulphonamides and sulphanilic and *p*-aminobenzoic acids, and attempting to reproduce the results on paper chromatograms. There was evidence of protein binding of some of these substances. Their movements in the plant are apparently physical rather than biological, and partition will probably play an important part in the system.—I.C.I. Ltd., Jealott's Hill Res. Stat., Bracknell, Berks.

17. Honda, S. I., and Robertson, R. N.
Studies in the metabolism of plant cells. XI. The Donnan equilibration and the ionic relations of plant mitochondria.
Aust. J. biol. Sci., 1956, **9**: 305-20, bibl. 20.

Ionic relations of mitochondria from red beetroot tissue (*Beta vulgaris* L.) suspended in various salt media were studied. Under the conditions of the experiments the mitochondrial suspensions behaved as a two-phase system, one containing immobile ions and showing Donnan effects. Some differences between mitochondria which showed simple Donnan characteristics and those accumulating chloride ions are described. Salts extracted from the mitochondria by 5% formaldehyde followed more closely the Donnan expectation than the total salt content or salts extracted by 5% trichloroacetic acid following the extraction with formaldehyde. External potassium readily replaced mitochondrial sodium but external sodium had little effect on potassium content of the mitochondria. The beetroot mitochondria are another instance of biological systems distinguishing between these two superficially similar elements. The potassium, sodium, calcium, phosphate, chloride, nitrogen, water, and dry weight contents were determined on mitochondria isolated from beetroot tissue in different ways and suspended in different media. A comparison with the constitution of cat-heart sarcosomes is given. The effect of pH during extraction of mitochondria from the beetroot tissues was investigated. The possibility of active transport of cations as well as anions is suggested. [Authors' summary.]—Div. Food Pres., C.S.I.R.O., and Bot. Sch., Univ. Sydney. [For part X see *H.A.*, 26: 41.]

18. Samorodova-Bianki, G. B.
The content of carotenoids and their dynamics in fertile and sterile anthers of some plant species. [Russian.]
Doklady Akad. Nauk. S.S.S.R., 1956, **109**: 873-5, bibl. 12.

Carotenoid accumulation in the anthers was found to be connected with microsporogenesis. This was shown by the interruption of carotenoid accumulation in sterile varieties of peach when pollen development ceased at the tetrad stage. Orange and mandarin varieties, in which meiosis and consequently microsporogenesis was interrupted, contained and accumulated considerably less carotenoids than varieties in which microsporogenesis proceeded normally.

Physiology.

(*See also* 66d, f, j, 67f, i, 975.)

19. Marais, P. G., and Fourie, S.
Influence of radio active rays on plants.
Dec. Fruit Gr, 1956, **6**: 170-3, illus.

Tomato and rye plants were grown in 2 soil types, given 3 levels of radio-active treatment and harvested at 3 different times. Only the highest rates of radio-active phosphorus increased dry weights of the plants. The P content of the upper plant parts were considerably increased by low applications of radio-active P, but root contents were not affected. The average P contents of 12-week-old plants were higher than those of 7-week-old plants. The response to radio-active P varied with soil type.

20. Pirovano, A.
Radiazioni ed isotopi in genetica e in biologia. **(Radiations and isotopes in genetics and biology.)** [English and German summaries 4 lines each.]
Sementi elette, 1956, **2**(6): 8-14, illus.

A popular account of mutations produced in various ornamental plants and vegetables by exposure to X-rays, gamma rays, isotopic radiation and electromagnetic fields.

21. Klein, W. H., Withrow, R. B., and Elstad, V. B.
Response of the hypocotyl hook of bean seedlings to radiant energy and other factors.
Plant Physiol., 1956, **31**: 289-94, bibl. 5, illus.

A method for the quantitative measurement of the photomorphogenic response of plants is presented, which uses the hypocotyl hook of bean seedlings. Six-day-old seedlings were found to give the most suitable reaction.—Smithsonian Inst., Washington, D.C.

22. Miller, C. O.
Similarity of some kinetin and red light effects.
Plant Physiol., 1956, **31**: 318-19, bibl. 12.

Responses to kinetin (6-furfuryl-amino-purine) of several plant tissues were studied. In etiolated bean leaf discs kinetin promoted the enlargement of laminar tissue and vein elongation. In tests with intact bean seedlings kinetin promoted leaf expansion, and elongation of the stems of the epicotyls and the petioles. Lettuce seed germination was promoted by kinetin although results were variable. Elongation of pea stem segments was inhibited by kinetin.—Univ. Wisconsin, Madison.

23. Scott, R. A., Jr., and Liverman, J. L.
Promotion of leaf expansion by kinetin and benzylaminopurine.
Plant Physiol., 1956, **31**: 321-2, bibl. 8.

Expansion of etiolated bean leaf discs was promoted by 2 kinins with or without Co, and given red light or darkness. There was an indication of competition between Co and the kinins.—Texas agric. Exp. Stat., College Station.

24. Schwabe, W. W.
Effects of natural and artificial light in Arctic latitudes on long- and short-day plants as revealed by growth analysis.
Ann. Bot. Lond., 1956, **20**: 587-622, bibl. 38.

The author describes the effects of different conditions of illumination on growth and flowering of *Kalanchoë blossfeldiana* and *Xanthium pennsylvanicum* (both short-day) and of annual varieties of *Hyoscyamus niger* and *Beta vulgaris* (both long-day). Winter barley, *Iberis umbellata* and tomato were also used in some selected treatments. The data collected showed that in the 4 main species studied the adverse effects on over-all growth to be expected from reduction of the daily photoperiod or of the intensity of illumination are in fact minimized. This compensation was effected mainly by large increases in leaf areas, and increased net assimilation rates may also have been involved. The leaf-area increases appear to have been due to increased cell size rather than cell number, and a close positive correlation with water content was found. Sugar-beet failed to bolt when half of its photoperiod consisted of light from fluorescent lamps. The flowering of barley and *Hyoscyamus* was also delayed considerably under these conditions. The deficiency of red in the spectrum of the fluorescent light is believed to have been the cause. The flowering of *Iberis* was not affected.—Imp. Coll. Sci. Technol., London.

25. KRASINSKIJ, N. P.
The cultivation of plants in artificial light under glass, and the increase in the effectiveness of illumination by CO_2 nutrition. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 64-72, bibl. 29, illus.

Supplementary artificial illumination combined with CO_2 application advanced the flowering of cineraria, hydrangea and rose, and improved the yields and quality of cucumber and tomato. Some data on the CO_2 content of the air in tomato and cucumber houses the quoted, and apparatus used for the production of are gas is described and illustrated.

26. KURSANOV, A. L.
Assimilation of carbon dioxide by plants through the roots. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 150-5, bibl. 14, illus.

$C^{14}O_2$, either as gas or dissolved in water, was found to be readily absorbed by the roots of bean seedlings. C appeared to be translocated as a carboxyl group in the phloem of the stem. This translocation was increased by illumination, but a large proportion of C was retained by chlorophyll-containing stem tissues. When the stem was shaded with tin-foil C moved up into the leaves. [See also *H.A.*, 23: 1454.]

27. SCHAFFALITZKY DE MUCKADELL, M.
Experiments on development in *Fagus silvatica* by means of herbaceous grafting.
Physiol. Plant., 1956, **9**: 396-400, bibl. 4, illus.

Leaf-shedding shoot tips from juvenile beech trees were grafted on seedling rootstocks and herbaceous tips were grafted in summer on branches of an old beech tree. Results from both experiments showed that it was not possible to maintain the leaf-shedding characteristic of the shoot tips after grafting.—Arboretum, Hørsholm, Denmark.

28. ŽEBRAK, A. R.
The nature of grafts in higher plants. [Russian.]
Bot. Žurnal, 1956, **41**: 358-70, bibl. 6.

Early grafting experiments with hemp and more recent work on grafting 2 varieties of pea are described, the results of which do not confirm the existence of so-called vegetative hybrids or the possibility of obtaining them by means of ordinary grafting. To obtain genuine vegetative hybrids the fusion of the vegetative cells of stock and scion is required, but such fusion does not take place during ordinary grafting.

Growth substances.

(*See also* 66a, s, 67j, m, 91, 92, 111, 120-128, 183, 190, 191, 207, 235, Weeds and weed control section, 438, 440, 487, 488, 529-533, 602, 624, 711, 739, 774, 885, 897, 923, 924, 934, 978, 992.)

29. BOTTELIER, H. P.
***Ageratum houstonianum* Mill. as test object for growth substances. 2. The effect of some external factors on the van Raalte root test.**
Ann. bogor., 1956, **2**: 175-81, bibl. 3.

Illumination during treatment with moderate concentrations of IAA greatly promoted root formation, the effect increasing with increased time of illumination. The lamina was found to play an important part in the root test. [For part 1 see *H.A.*, 25: 2411e.]

30. BOTTELIER, H. P.
***Ageratum houstonianum* Mill. as test object for growth substances. 3. The significance of the age and the presence of the lamina for the petiole test.**
Ann. bogor., 1956, **2**: 183-92, bibl. 2.

Curvature of petioles of *Ageratum houstonianum* in IAA in the light started when they were about 4 mm. long, and between this length and 40 mm. the curvature for each growth substance concentration was a function of petiole length. In light the angle of curvature for a given growth substance was maximal at the 3rd leaf pair and then decreased. In darkness curvature responses were delayed; the angle of curvature for a given leaf pair and the age at which this angle is maximal were dependent on an unknown external factor. The curvature in light was similar to that in the dark when the petiole remained attached to the lamina. Curvature of very young petioles (7–20 mm. long) with lamina was much stronger both in light and in dark than without the lamina in the dark. Young petioles curved more strongly in the dark at 13° C. than at 26° C.

31. (MARTH, P. C., AUDIA, W. B., AND MITCHELL, J. W.)
Amazing gibberellic acid.
Agric. Res. Wash., 1956, **5**(3): 12-13, illus.
Beltsville studies gibberellic acid.
Flor. Exch., 1956, **127** (12): 11.

In greenhouse experiments gibberellic acid applied in lanolin paste to young stems of geraniums, poinsettias, sunflowers, roses, salvias, dahlias, petunias and asters increased their height 3-fold within 3–4 weeks as compared with untreated controls. The heights of snap beans, soya beans, ground nuts, peppers, eggplants, maize and barley were in many cases doubled or trebled, but direct application to the fruits of tomatoes, snap beans and peppers did not affect growth. New growth of willow oaks, tulip poplars and maples, but not that of pines or white spruce, was also greatly increased following treatment. During the 2 to 3 weeks following treatment the weight and dry matter contents of young soya bean and snap bean plants were increased by 30 to 40%. Tests showed that this chemical retarded flowering in some ornamental and crop plants and advanced flowering in others.—Agric. Res. Center, Beltsville, Md.

J.R.L.

32. WEINSTEIN, L. H., AND OTHERS.
Growth-promoting effects of ethylenediamine tetra-acetic acid.
Nature, 1956, **178**: 1188, bibl. 2.

The disodium salt of EDTA at 5×10^{-5}M, alone or in conjunction with indole acetic acid at 1×10^{-5}M, caused elongation and increased water uptake in hypocotyl sections of etiolated lupin seedlings. The reverse effects were produced by ferric disodium EDTA at 10^{-4}M.—Boyce Thompson Inst., Yonkers, N.Y., and Rutgers Univ.

33. SCARAMELLA PETRI, P.
L'uso della bile come sostanza rizogena.
(The use of bile as a root-inducing substance.)
Nuovo G. bot. ital., 1954, **61**: 736-40, illus.

Recent anatomical observations on reactions of roots to growth substances are briefly reviewed. Injection of 0·2% aqueous solutions of bile into roots of various plants induced the formation of secondary roots which rapidly gave off lateral roots. Bile from rabbits and bullocks was more effective than that from pigs in causing vine cuttings to root. Onion bulbs grown in solutions containing 0·2% of bile developed swollen, stunted and brown roots. In 0·15% solutions the roots developed swellings which gave rise to branch roots. At and below 0·1% the action was negligible.

34. RANJAN, S., DUTT, A. K., AND MALAVIYA, B.
Effect of γ-(3 indolyl)-*n*-butyric acid on the leaf movement of *Mimosa pudica* Linn. in diffused daylight and artificial light.
Curr. Sci., 1956, **25**: 228-9, bibl. 2, illus.

In diffused daylight lanolin paste containing hormone was applied to the lower side of *Mimosa pudica* pulvini and caused a succession of upward and downward movements of the treated leaves. In artificial light application of hormone paste to the lower side of the pulvini caused a rapid upward movement for 6 hours followed by a downward movement for 3½ hours. When the hormone paste was applied to the upper side of the pulvini, leaves moved rapidly downwards in both diffuse and artificial light. The rate of movement by treated leaves was faster in artificial light than in diffuse light.

35. HAMNER, K. C., AND NANDA, K. K.
A relationship between applications of indoleacetic acid and the high-intensity-light reaction of photoperiodism.
Bot. Gaz., 1956, **118**: 13-18, bibl. 14.

Experiments with *Xanthium pennsylvanicum* Wallr. showed that the concentration of applied indole-3-acetic acid (IAA) necessary to inhibit flowering is dependent upon the length of previous exposure to high-intensity light and suggest that the IAA reacts with some product produced during the photoperiod. Such interaction presumably changes this light product in such a way that it is incapable of participating in the photoperiodic reaction to produce the flowering stimulus. Results with Biloxi soybean (*Glycine max*) in similar experiments indicated that the degree of inhibition by applied IAA is proportional to the log of its concentration and suggest that the reaction may be a simple one and that the light product may possibly be a single compound, although such a conclusion must be most tentative. If the high-intensity-light product should prove to be a single compound, then it seems probable that it will be found to be a direct precursor of the flower hormone. [Authors' summary.] —Dep. Bot., Univ. Calif., Los Angeles.

36. CALLAGHAN, J. J., AND VAN NORMAN, R. W.
Effect of foliar sprays of maleic hydrazide on photosynthesis.
Science, 1956, **123**: 894, bibl. 1.

Seedlings of Swiss chard and tobacco were sprayed with maleic hydrazide at 0·375 and 3 g. per l. Compared with leaves from unsprayed plants, those developed after treatment had significantly fewer and larger chloroplasts. Photosynthesis rates were markedly increased even at the lower concentration, which had little effect on dry weight, respiration rate and chlorophyll concentration. Increased photosynthesis at the higher concentration was partly accounted for by reduced respiration and increased chlorophyll concentration.—Dep. Bot., Pennsylvania St. Univ.

37. WAREING, P. F., AND FODA, H. A.
Possible role of growth inhibitors in the dormancy of seed of *Xanthium* and lettuce.
Nature, 1956, **178**: 908-10, bibl. 3.

It was shown that the seed, in particular the embryo, of *Xanthium pennsylvanicum* contains two highly active growth inhibitors and the mechanism of their action was studied experimentally. The authors have, moreover, found that when lettuce seed is extracted and separated by the same chromatographic techniques as are used for *Xanthium* seed, inhibitory zones appear (in coleoptile tests) at the same R_F values as the A and B inhibitors of *Xanthium* seed, showing the same bright green and blue fluorescence as the latter. By analogy with the phenomena in *Xanthium*, it would seem that inhibitors may play a part in the dormancy of lettuce seed. A detailed discussion of the work will be published elsewhere.—Univ. Manchester.

Tissue culture.

38. RAGGIO, M., AND RAGGIO, N.
A new method for the cultivation of isolated roots.
Physiol. Plant., 1956, **9**: 466-9, bibl. 2, illus.

In a new method of excised root culture organic nutrients are supplied via the root base and inorganic nutrients constitute the medium in contact with the rest of the root. Bean roots grown in this way showed no browning, and a high percentage of nodulation was obtained in isolated bean roots inoculated with rhizobia.—Univ. Calif., Berkeley.

39. TORREY, J. G.
Chemical factors limiting lateral root formation in isolated pea roots.
Physiol. Plant., 1956, **9**: 370-88, bibl. 28, illus.

Intact and segmented pea roots were grown in nutrient culture. It was found that lateral root initiation requires, in addition to auxin, an available supply of thiamin, nicotinic acid, adenine and one or more micronutrient elements. The addition of pyrithiamin, 3-acetyl pyridine or 2,6-diaminopurine to the medium inhibited lateral root initiation, but this effect was reversible. An optimum initiation response *in vitro* was obtained at pH 6–6·4. A substance was produced by the root tip which inhibited lateral root formation in pea roots; in an extract from root tips of germinating peas inhibition was 50% in otherwise optimum nutritional conditions.—Univ. Calif., Berkeley.

Soilless culture.

(*See also* 98, 912, 950k.)

40. Stoughton, R. H.
Cultural and chemical aspects of crop production. Soilless cultivation and its application to crop production.
Chem. Ind. Lond., 1956, No. 42, pp. 1175-8.

The main principles, disadvantages and advantages of various types of soilless cultivation are briefly discussed, with notes on the sources of nutrients and solution preparation. Flower production seems to be most suited to these methods.

41. Emmert, F. H.
An apparatus for hydroponics research.
Bull. Storrs agric. Exp. Stat. 322, 1956, pp. 7, illus.

The apparatus, described here with the aid of illustrations, has been operated at the University of Connecticut for 3 seasons with very satisfactory results. It combines a minimum labour requirement with a satisfactory degree of nutritional control. The plants are grown in individual containers, with ¼ in. silica gravel used as a medium in preference to sand. Drying out of the gravel and contamination by air-borne particles, rainwater or sprays are prevented by slit covers.

Nutrition.

(*See also* 66c, l, 67e, 980, 991.)

42. Bormann, F. H.
Material transfer between plants through adjacent root systems.
Abstr. in *Bull. ecol. Soc. Amer.*, 1956, **37**: 67.

Transfer of materials from one plant to another through adjacent, intertangled root systems has received little attention. To evaluate such transfers two root systems are developed on one plant (the donor); one system is planted alone in a container, while the other system is planted with the roots of an experimental plant in another container. Test materials may be added to the former container and withheld from the latter. Detection of the test material in the experimental plant indicates a transfer from the roots of the donor plant to those of the experimental plant. Results show that water and phosphorus can move between adjacent root systems, the former in sufficient quantities to prevent wilting in some instances. If this phenomenon is widespread in nature it will necessitate a revision of present concepts of competition between roots of plants.—Dartmouth Coll., Hanover, N.H.

43. Nicol, H.
Manuring of greenhouse crops.
Proc. Fert. Soc., No. 39, 1956, pp. 3-29, bibl. 19.

Nutrient and saline effects of fertilizers are inseparable; they respectively promote and oppose plant growth. Opposition to plant growth is exerted through osmotic pressure or pF of which the resultant can be found by application of the pH/pC concept. Yield-curves are discussed in terms of pF and pC. pC alone is not an unambiguous index of plant growth or yield. When determined under appropriate conditions, pL (=2pH pC) is an integral of the physico-chemical situation, and may provide a better index of growth—though not necessarily of yield of fruit. Nitrification, and consequent excessive uptake of manganese and sulphate by plants, may be a major source of trouble in greenhouse cropping. "Balance" is discussed with special reference to the properties of calcium sulphate and to the relation $pC = pN + 1{\cdot}17$. The term *vertumnal balance* is introduced to denote agreement with that relation. If calcium sulphate and other nutrients are all ample, as they usually are in greenhouse soils, it is suggested that vertumnal and nutrient balances become the same thing. Methods are outlined and discussed for ascertaining departure from vertumnal balance; and other applications of pC relations are mentioned. Data about effects of steaming and watering of greenhouse soils are given in an appendix.—[Author's summary.]

44. Lehr, J. J.
Experiences on fertilising horticultural crops with sodium.
Comm. Plant Nutrit. Res. Lab. Chilean Nitrate agric. Serv. 3, 1956, pp. 6.

On a light sandy soil, high in K but low in Na, the response of leafy vegetables to nitrate of soda and nitrate of lime fertilizer application at different K levels was observed. After 4 years' of trials beet, spinach and celery showed marked responses to K, while red cabbage and onion showed little effect. All crops benefited greatly from the application of sodium. The nitrate salt was a more active source of sodium than the chloride or sulphate. In a field experiment with red currants yields from plots receiving nitrate of soda were in general better than those receiving nitrate of lime. [See also *H.A.*, 24: 42.]—Plant Nutrition Res. Lab., Wageningen.

Soil and composts.

(*See also* 66g, i, k, o, q, t, 67b, 702, 956.)

45. Tamés, C., and Peral, M. T.
Manejo de los suelos ácidos. (**Management of acid soils.**)
Bol. Inst. Invest. agron. Madrid, 1956, **16**: 1-15, bibl. 1.

Recent work on the reaction of various crop plants and nitrogen-transforming bacteria to soil pH is reviewed with special reference to excess of active Al, Fe and Mn in the soil. Limiting and optimal pH values are given for sugar cane, pea, bean, capsicum, castor bean, tobacco and onion. Liming is discussed with reference to climate and soil type.

46. Schubert, O. E.
Fall fumigation of field soil with methyl bromide for use in growing greenhouse plants.
Down to Earth, 1956, **12**(2): 22-3, illus.

Soil from a plot fumigated with 1 lb. of methyl bromide per 100 sq. ft. in the autumn was taken into the greenhouse in early spring and mixed with sand and peat for raising vegetables and flowers. The soil mixture remained free of weeds throughout the growing season, from April till late June, and loss of plants due to damping-off was almost eliminated. The cost of fumigation was only 10% of the cost of weeding plus the value of plants lost in non-fumigated soil.

47. GERRETSEN, F. C., GROOTENHUIS, J. A., AND KOLENBRANDER, G. J.
De compostering van stro, met en zonder compost-activators. **(Composting straw, with and without activators.)** [English summary 2 pp.]
Versl. Landbouwk. Onderz. **62.1**, 1956, pp. 43, bibl. 1.

Three activators, Vétrisol, Fertosan and Q.R., were tested as activators of a straw compost. None showed any beneficial effect on the composting process, and the resulting composts did not differ from pure straw composts in manurial effect.

48. VOGEL, G.
Kompostdämpfung mit Dränagerohren. **(Compost sterilization with drainage pipes.)**
Dtsch. Gartenb., 1956, **3**: 151-3, bibl. 6, illus.

The total cost of steam sterilizing compost for cucumber and tomato beds was reduced by about 40% by using drainage pipes. The pipes, of 65 mm. diameter, were spaced at about 0·4 m. each way in the heap which was covered with straw mats; the steam was blown into the pipes for 6 hours.

Glasshouses and hotbeds.

(*See also* 43, 46, 66p, u, 67g, n.)

49. GARTENWELT.
Gartenbautechnik in Europa. **(Horticultural engineering in Europe.)**
Gartenwelt, 1956, **56**: 235-53, bibls, illus.

In this issue several foreign and German experts have contributed articles on horticultural engineering. The articles include: Radiation heating in glasshouses, by E.W.B. van den Muijzenberg; Glasshouses and heating, by E. R. Hoare; an article on soilless cultivation in glasshouses, by S. Rygaard; A new heating system (which includes mixing valves), by S. Lauther; The optimum breadth for glasshouses, by T. Rautavaara; Irrigation in glasshouses, frames and in the open, by K. Witte; Soil sterilization by steam, by L. G. Morris; and Artificial materials for covering the growing area, by W. Renard.

50. BRAAK, J. P., AND SMEETS, L.
The phytotron of the Institute of Horticultural Plant Breeding at Wageningen, Netherlands. [Dutch summary 5 lines.]
Euphytica, 1956, **5**: 205-17, bibl. 3, illus.

The new phytotron, the design of which is described and illustrated here, consists of a number of glasshouses and experimental rooms where temperature and air humidity as well as duration and intensity of light can be controlled. The accuracy of temperature and humidity control over the last 3 years is summarized.

51. COOMBE, J.
Steel-framed, movable glasshouse.
N.Z. J. Agric., 1956, **93**: 174-81, illus.

A description, including photographs and diagrams, is given of a new steel-framed glasshouse 93 ft. × 20 ft., which can be moved by 4 men along rails set on permanent foundations 186 ft. × 20 ft.

J.R.L.

52. NATIONAL INSTITUTE OF AGRICULTURAL ENGINEERING.
Report on test of "Thermoplus" brand of polythene film of 0·0015 in. gauge used for insulating glasshouses.
Rep. N.I.A.E. **125**, 1956, pp. 5, bibl. 4.

The installation and removal of Thermoplus as lining for an empty greenhouse by untrained labour was comparatively simple. The reduction in average heat loss by the polythene film was equivalent to 0·38 B.t.u./ft²hr.°F. The transmission of solar radiation and therefore of light was slightly reduced by the film.

53. SOMOS, A.
A melegágy hőviszonyainak változása különböző biofűtők hatására. **(The effect of various biological heating materials on hotbed temperatures.)** [Russian and German summaries 2 pp. each.]
Agrártud. Egy., 1954 (issued 1956), **18** (2, part 2): 3-30, bibl. 6.

Hotbeds were prepared with farmyard manure, leaves and a 1 : 1 by weight mixture of the two. There was little difference between the average temperature of the different units of the hotbeds (heating material, soil and air) heated with the 3 materials. In all beds the temperature of the air was the highest during the day, that of the heating materials in the morning. Soil temperatures were the lowest throughout. The mixed heating material was found to be satisfactory and the temperatures produced by it were similar to those produced by farmyard manure, but peppers developed faster and matured earlier in beds prepared with the latter.

Marketing.

54. DIGBY, M., AND GRETTON, R. H.
Co-operative marketing for agricultural producers.
FAO agric. Dev. Paper **53**, 1955, pp. 80, bibl. 16.

The authors describe the principles and workings of a marketing co-operative, and some of its dangers are discussed. Before the final conclusions are drawn, a group of illustrations give a brief story of successful co-operative marketing ventures with several products, including carobs, cocoa, coffee, dried and citrus fruits, fibres, fresh fruit and vegetables, oilseeds, copra, rubber, sugar, tobacco and wine.

55. FRENCH, B. C.
Industry cooperation in studies of fruit and vegetable packinghouse efficiency.
J. Fm. Econ., 1955, **37**: 1209-14, from abstr. in *Quart. Bull. Mich. agric. Exp. Stat.*, 1956, **39**: 190.

This paper discusses the effect of type of efficiency study on the degree of industry cooperation, methods of obtaining cooperation, means of getting the results applied, and a brief evaluation of accomplishments in Michigan.

56. MANN, G.
Is pre-cooling in Britain worth while?
Grower, 1956, **46**: 907-10, illus.

Figures showing the maximum rates of cooling of some fruits and vegetables are given. Data show that factors other than the temperature of the cooling medium affect the rate of cooling, these include size of the load, method of stowage, rate of heat transfer, and design and porosity of the pack. Experiments in progress in England indicate that pre-cooling of soft fruits or leafy vegetables for transport or weekend storage may be worthwhile.—Ditton Lab., D.S.I.R.

Machinery and apparatus.

(*See also* 66b, r, 153-155, 157, 181z, 626, 872, 873, 1003e.)

57. de Roo, H. C.
Subsoiling, plowing, and deep placement of lime or fertilizer in one operation.
Agron. J., 1956, **48**: 476-7, bibl. 2, illus.

The tractor-mounted machine described differs from conventional subsoilers in that the subsoiler chisel, with a fertilizer chute attached to it, operates in the bottom of the open plough furrow between the tractor furrow wheel and the plough share. The machine is being tested for preparing land for tobacco, corn and vegetables. A photograph of the root system of a tobacco plant shows profuse root development in the fractured and fertilized zones below 3 adjacent plough soles.—Conn. agric. Exp. Stat., New Haven.

58. Anon.
Moto-matchette.
World Crops, 1956, **8**: 497, illus.

This implement, manufactured in France, consists of a motor and transmitting axle in a metal tube, at the end of which may be attached a hoeing device, circular saw, pruning saw, lopping attachment or auger. The only hand lever is situated on the shaft and controls the speed of operation of the working head. The implement is carried on a harness and is recommended for use in orchards and vineyards.

59. (Plant Protection Ltd.)
Low-cost low-level irrigation.
Comm. Gr, 1956, No. 3168, p. 579, illus.
Irrigation by holes in the pipe.
Grower, 1956, **46**: 622, illus.

A new automatic irrigation system, originating from America, has been developed at Fernhurst Research Station, using 2¼ in. diameter "lay-flat", black, polythene tubing. Groups of 4 holes are punched every 5 inches, and the jets give a lateral spread of water of 6–18 inches according to pressure. The tubing can also be used for liquid feeds, winter flooding, and application of sterilizing chemicals and parathion. It is said to have simplified feeding and improved the quality of carnations.

60. Hoare, E. R.
How the electronic leaf works.
Grower, 1956, **46**: 99, 101, illus.

An electronic leaf to control intermittent mist application, with a circuit to allow for variation in the moisture requirement of the plants, has been designed by the National Institute of Agricultural Engineering. The circuit is described and illustrated in a diagram.

61. Hudson, J. P.
The use of controlled water regimes in experimental work.
Reprinted from *Soil Zool.*, being *Proc. Univ. Nottingham 2nd Easter Sch. agric. Sci., 1955*, pp. 449-51, bibl. 4.

A few general comments resulting from experience gained in experimental work on vegetables in the University of Nottingham Department of Horticulture are given with regard to: (1) Methods of bringing soil to a uniform moisture status; and (2) maintaining water regime in (*a*) beds of soil, (*b*) glazed drainpipes, and (*c*) unglazed plant pots. [See also *H.A.*, 26: 719 and 4292.]

62. Heydecker, W.
Production of controlled atmospheres in the soil.
Reprinted from *Soil Zool.*, being *Proc. Univ. Nottingham 2nd Easter Sch. agric. Sci., 1955*, pp. 445-8, bibl. 5, illus.

A simple apparatus is described and illustrated, by means of which it is possible to produce soil atmospheres in which the proportions of N_2, O_2 and CO_2 may be varied. As an example of its application the results are given of an experiment on the germination of cabbage, carrot, lettuce and onion seeds, which showed that, by comparison with air, a high concentration of CO_2, in an atmosphere consisting of $8N_2 : 1O_2 : 1CO_2$, markedly retarded germination and depressed seedling growth.—Dep. Hort., Univ. Nottingham.

63. Dutton, R. W., and Dalgliesh, C. E.
An apparatus for preparative photosynthesis of ^{14}C-labelled substances.
J. chem. Soc. Lond., October 1956, pp. 3792-6, bibl. 4, illus.

An apparatus is described which permits photosynthesis on a laboratory preparative scale of systems useful for producing isotopically labelled substances. The biosynthesis of carbohydrate using tobacco leaves and of whole organisms using the alga *Chlorella vulgaris* is illustrated. The system is flexible, depends solely on artificial light, and allows efficient circulation of $^{14}CO_2$ in both gaseous and liquid systems. [Authors' abstract.]—Postgrad. med Sch., London. [See also 66j.]

64. Idle, D. B.
Studies in extension growth. I. A new contact auxanometer.
J. exp. Bot., 1956, **7**: 347-61, bibl. 8, illus.

Various types of auxanometer are discussed, and a new contact auxanometer is described that is capable of recording a total extension of about 0·4 cm. to within an accuracy of 0·5 μ per minute. Some specimen records of the extension of etiolated *Vicia faba* epicotyls showing some effects of mechanical stimulation are given. [Author's summary.]—Dept. Bot., Univ. of Southampton.

65. Butler, C. G., and Haigh, J. C.
A note on the use of honey-bees as pollinating agents in cages.
J. hort. Sci., 1956, **31**: 295-7, illus.

Equipment is described and illustrated which makes it possible to use a queen-right colony of honey-bees to pollinate small numbers of plants without contamination from unwanted pollen and without abnormal losses of bees. The hive is provided with two exits, one to the plant cage and the other to the open air, making it possible to alternate periods of confinement and of free range. Tests with different cruciferous plants flowering inside and outside the cage showed that no cross-pollination occurred when bees were confined and released on alternate days, the foraging bees being thoroughly cleansed of all pollen during each night. —Rothamsted exp. Stat. and Nat. Veg. Res. Stat., Wellesbourne.

Noted.

66.

a Abad Manrique, J. B.
Estudios fisiológicos sobre hormonas vegetales. I. Métodos de valoración. II. Extracción. (**Physiological studies on plant hormones. I. Methods of quantitative determination. II. Extraction.**)
Farmacognosia, 1949, **9**: 39-88, bibl. 66, illus., and 89-130, bibl. 44, illus. [received 1956].

b Anon.
National NA-75.
World Crops, 1956, **8**: 497-8, illus.
A new agricultural aircraft designed for "ground-level" flying by the National Aircraft Corporation of Burbank, Calif.

c Barrows, H. L., Drosdoff, M., and Gropp, A. H.
Rapid direct polarographic determination of zinc in plant ash solutions.
Agric. Food Chem., 1956, **4**: 850-3, bibl. 15.
Developed primarily for determining Zn in tung leaves, but has been used successfully with leaves of citrus, apple, cherry and peach.

d Bell, L. N.
A photoelectrical apparatus for measuring photosynthetically active radiation (Photoelectrical phytoactinometer.) [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 257-64, bibl. 7, illus.

e Białobok, S.
Rys historyczny Zakładu Dendrologii i Pomologii w Kórniku oraz ogólna charakterystyka kólekcji drzew i krzewów. (**A historic outline of the Institute of Dendrology and Pomology at Kornik and the general characteristics of the collection of trees and shrubs.**) [English and Russian summaries 1 p. each.]
Arbor. Kórnickie,* 1955, **1**: 7-30, illus.

f Broyer, T. C.
Current views on solute movement into plant roots.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 570-86, bibl. 45.
A review.

g Bunt, A. C.
An examination of factors contributing to the pH of John Innes composts.
J. hort. Sci., 1956, **31**: 258-71, bibl. 13.

h Chapman, H. W.
A low cost environmental control chamber for plant investigations.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 1-4, bibl. 4, illus.
A general purpose chamber; probable cost, using old materials $400, new materials $600; complete blue prints available.—Univ. Neb., Lincoln.

i Criddle, W. D., and others.
Methods for evaluating irrigation systems.
Agric. Handbook Soil Cónserv. Serv. U.S. Dep. Agric. **82**, 1956, pp. 24, illus.
For furrow, border and sprinkler methods.

j Dalgliesh, C. E., and Dutton, R. W.
The preparation of uniformly ^{14}C-labelled substances on a laboratory scale, with special reference to L-tryptophan.
J. chem. Soc. Lond., October 1956, pp. 3784-91, bibl. 19.
From tobacco leaves and *Chlorella* by 2 methods [see also abstract 63].

k Darlot, —.
Conception rationnelle d'un réseau d'irrigation par aspersion. (**A plan for a sprinkler irrigation system.**)
Fruits et Prim., 1956, **26**: 57-66.

l Drake, M., and Campbell, J. D.
Cation exchange capacity of plant roots as related to plant nutrition.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 563-9, bibl. 13.
A review, including data on 18 vegetable crops.

m Fairbank, H.
N.A.A.S. Experimental Horticulture Stations, Luddington.
Agriculture, Lond., 1956, **63**: 322-6, illus.

n Fairfield (N.A.A.S.).
Station Guide Fairfield Experimental Horticulture Station, 1956, Kirkham, Preston, Lancs, pp. 18.
Work in progress outlined.

o de Forges, L.
Les pompes dans l'irrigation par aspersion. (**Pumps for sprinkler irrigation.**)
Fruits et Prim., 1956, **26**: 67-72.
The use of piston pumps and turbo-pumps in sprinkler irrigation is discussed.

p Gray, A.
The electrically heated greenhouse.
Gdnrs' Chron., 1956, **140**: 318, illus.

q Grevet, —.
Les tuyauteries en irrigation par aspersion. (**Pipes for sprinkler irrigation.**)
Fruits et Prim., 1956, **26**: 109-18, illus.

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* Formerly *Prace Zakl. Dendrol. Pomol. Kórniku.*

r HARRIS, E.
Role of the National Institute of Agricultural Engineering.
World Crops, 1956, **8**: 478-82, illus.

s HEATH, O. V. S., AND CLARK, J. E.
Chelating agents as growth substances.
Nature, 1956, **178**: 600-1, bibl. 1.
Further biological evidence on mode of action. [See also *H.A.*, 26: 3268.]

t HOARE, E. R.
Irrigation equipment—its choice and application.
Agric. Rev. Lond., 1956, **2**(4): 26-31, bibl. 9.

u HOARE, E. R., AND MORRIS, L. G.
The heating and ventilation of glass-houses.
Reprinted from *J. Instn Brit. agric. Engrs*, 1955–56, **12**: 1-26, bibl. 8, illus.
For shorter article see *H.A.*, 26: 1355.
A review.

v HOWARD, SIR H.
Commonwealth Agricultural Bureaux organisation.
World Crops, 1956, **8**: 472-4.
History, organization, work, administration, finance and publications.

w INTENGAN, C. L., AND OTHERS.
Composition of Philippine foods, IV.
Philipp. J. Sci., 1955, **84**: 343-64, bibl. 2.
Sugar cane, seed and leafy vegetables, nuts, seaweed and fruits.

x JIMÉNEZ-CUENDE, F.
Advances in Spanish agriculture.
World Crops, 1956, **8**: 439-42, illus.
Progress in irrigation, mechanization and development schemes.

y KULKARNI, L., AND SOHONIE, K.
Glutamic acid decarboxylase in legumes.
Nature, 1956, **178**: 925, bibl. 5.
In seeds of *Phaseolus*, *Pisum*, *Vicia* and other leguminous genera.

z LAURENT, R., AND OTHERS.
Les matières plastiques. (**Plastic materials.**)
Fruits et Prim., 1956, **26**: 218-27, illus.
The properties of plastics and their uses in horticulture.

67.

a LEPPIK, E. E.
The form and function of numeral patterns in flowers.
Amer. J. Bot., 1956, **43**: 445-55, bibl. 27, illus.

b MARTIN, J. P., AND OTHERS.
Chemicals for soil conditioning.
Agric. Food Chem., 1956, **4**: 842-7, illus.
The 3 most commonly used are HPAN, VAMA and IBMA.

c NIEMAN, R. H.
Salt-activated respiration in excised roots of the garden pea.
Bot. Gaz., 1956, **118**: 1-13, bibl. 31, illus.
[See also *H.A.*, 26: 611.]

d NORTH, C.
A technique for measuring structural features of plant epidermis using cellulose acetate films.
Nature, 1956, **178**: 1186-7, bibl. 3, illus.
Devised at the Scottish hort. Res. Inst., Mylnefield, Invergowrie.

e OHLROGGE, A. J.
The Purdue soil and plant tissue tests.
Stat. Bull. Purdue Univ. agric. Exp. Stat. **635**, 1956, pp. 15, bibl. 6, illus.
Instructions for the use of the testing outfit in diagnosis of nutritional deficiencies.

f PARAMESWARAN, S.
An apparatus for the determination of the water requirements of crops.
Curr. Sci., 1956, **25**: 250-2.
An electronic method of measuring evapotranspiration.

g SADASIVAN, T. S., SARASWATHI-DEVI, L., AND SULOCHANA, C. B.
A thermostatically controlled miniature glass-house.
Curr. Sci., 1956, **25**: 301-2, illus.
A laboratory unit holding 16 plants in 4 in. pots.

h SHEARD, G. F.
Polythene in horticulture.
Agriculture, Lond., 1956, **63**: 331-4, bibl. 1.
A review.

i STERLING, C., AND CHICHESTER, C. O.
Autoradiography of water-soluble materials in plant tissues.
Stain Tech., 1956, **31**: 227-30, bibl. 9, illus.
Using a section of peach tissue.

j SWANSON, C. R., AND OTHERS.
Effect of 2,4-dichlorophenoxyacetic acid and other growth-regulators on the formation of a red pigment in Jerusalem artichoke tuber tissue.
Plant Physiol., 1956, **31**: 315-16, bibl. 2.

k THOMAS, R. G.
Effects of temperature and length of day on the sex expression of monoecious and dioecious angiosperms.
Nature, 1956, **178**: 552-3, bibl. 3.
In *Mercurialis ambigua* and *Cannabis sativa*.

l TUKEY, H. B.
Liberty Hyde Bailey—horticulturist.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 559-62.
An appreciation [see also abstract 960].

m WAIN, R. L.
The regulation of plant growth with chemicals.
Sci. Progr., 1956, **44**: 604-18, bibl. 54.
With emphasis on work at Wye College.

n WHITTLE, R. M., AND LAWRENCE, W. J. C.
Glasshouse design—meeting the needs of climate.
Agric. Rev., 1956, **2**(6): 31-5, illus.
Work at John Innes on light, heat and ventilation in glasshouses reviewed.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 3, 181f, n, o, s, x, 962, 979, 982, 985, 986, 994, 995, 999, 1003a, b.)

68. C.S.I.R.O., Australia.
Fruit investigations.
A.R. C.S.I.R.O., 1955, 1955, pp. 25-6.

Physiology of apple fruits in relation to storage disorders. A leaf response to sprays of N, P and K was obtained, but the fruit response was to N only. Under conditions of N depletion fewer cells were formed and the respiration rate was increased. Fruit breakdown occurred first in fruits with a smaller number of larger cells. Fruit size was positively correlated with seed number per fruit within a tree, but there was a negative correlation of seed number per fruit and mean fruit size between trees. Treatment with growth substances affected seed number per fruit independent of fruit size and without affecting yield. *Bud and fruit development in apples.* Studies in the fourth year of summer drought showed that Jonathan blossomed lightly but set well, while Granny Smith blossomed well but set poorly. Watered Jonathans continued lateral growth for longer and completed flower initiation earlier than did drought-parched trees. On the day before opening blossom buds of healthy Granny Smith averaged $\frac{1}{3}$ more cells than those from trees showing Zn deficiency. *Rootstock trials:* Jonathan trees on Malling I were more moisture-demanding than those on Northern Spy. Delicious on Merton stocks (mainly 778 and 793) are larger than those on Northern Spy at 3 years.

69. Luckwill, L. C.
Pomological research in Poland.
Nature, 1956, **178**: 1089-90, illus.

A short account is given of the functions and aims of the new Research Institute of Pomology, situated at Skierniewice, about 40 miles south-west of Warsaw. Under the directorship of Prof. S. A. Pieniazek it will be responsible for co-ordinating pomological research throughout Poland. Despite an acute shortage of trained scientific workers there is evidence that the Institute will approach its problems with vigour and with an open mind concerning the widely differing ideas and techniques developed in Russia and in Western Europe. Among the problems needing attention undoubtedly the most serious is winter killing, which has resulted in great fluctuations in the population of fruit trees in Poland during the past 20 years.

70. Kemmer, E., and Mante, W.
Über Zusammenhänge zwischen Wirtschaftsform und Aufwand im Obstbau. **(On relationships between economic structure and cost in fruit growing.)**
Reprinted from *Obstbau*, 1956, **75**: 119-22, bibl. 13.

Data have been collected on the economics of 4 kinds of holding in which fruit-growing was of varying importance. Efficiency in fruit-growing increa with its importance to the holding.

71. Fjäderhane, A. M.
Arbetsstudier i fruktodlingen. **(Labour studies in fruit growing.)**
Medd. Alnarpsinst. trädgårdsekon. Byrån **24**, 1956, pp. 20, illus.

These latest time studies in fruit growing are chi concerned with the application of mist sprays by vari types of apparatus, but the foliar application of nutri solutions and the harrowing of orchards are a discussed.

72. Crossa-Raynaud, P.
Enquêtes fruitières. **(Fruit surveys.)**
Rapp. Serv. bot. agron. Tunis. 1955, 1956, pp. 173-80.

Brief reports are given on the behaviour of cert varieties of almond, orange (Clementine), ap apricot, peach, pear and plum in various parts Tunisia. Yields are compared for a number of o varieties.

73. Kárpáti, Z.
Gyümölcstermesztési tájaink növényföldrajzi vonatkozásai. **(Plant-geographical relations in Hungarian fruit growing.)** [Russian and German summaries 2 and 3 pp. respectively.]
Agrártud. Egy., 1954 (issued 1956), **18** (2, part 1): 21-40, bibl. 26.

A discussion on the geographical distribution of main tree fruit and nut species in Hungary based maps included in I. Okályi's "Gyümölcstermelés [Fruit production 1.], 1954.

74. Juras, I.
Prilog metodici bonitiranja tla za potrebe rajonizacije južnog voćarstva. **(A contribution to the method of agro-ecologic classification of soils from the point of view of their relationship with Mediterranean fruit species.)** [French summary 1 p.]
Reprinted from *Bilj. Proizv.*, 1953, No. 4, pp. 171-7, bibl. 23.

The abundance, distribution and vigour of fruit t species have been used in determining the "ag ecologic" value of soils for these species in Dalma The species studied were fig, almond, sour cherry a olive in the north and olive, almond, citrus, fig a carob in the south.

75. Juras, I.
Edafski uvjeti za proizvodnju smokava u Dalmaciji. **(Edaphic conditions and fig growing in Dalmatia.)** [English summary 9 lines.]
Bilj. Proizv., 1956, **9**: 21-6, bibl. 23.

The fig-growing soils of Dalmatia are briefly descri and the soil requirements of different fig varieties discussed.

76. Grooten, R.
La culture des fruits à noyau en Belgique. **(Growing stone fruits in Belgium.)** [English and German summaries 4 lines each.]
Rev. Agric. Brux., 1956, **9**: 907-35.

Cherries, plums and peaches are discussed in relation to geographical distribution, cultural details, production in recent years, imports and exports, and market prices.

77. Baldini, E.
Aspetti e problemi della coltura delle prugne in Italia. **(Aspects and problems of the cultivation of prunes in Italy.)** [English, French and German summaries ½ p. each.]
[*Publ.*] *Cons. naz. Ric. Ist. naz. Nutr.*, 1955, pp. 15, bibl. 20, illus.

A paper read at a congress on dried fruits (Bari, Sept. 1954), recommending exclusion of unfavourable varieties, detailed study of stock-scion compatibility and soil requirements, and more widespread irrigation.

Breeding and varieties.

(*See also* 181c, e, g, m, u-w.)

78. Spangelo, L. P. S., and others.
Breeding apples for resistance to scab.
Canad. J. agric. Sci., 1956, **36**: 329-38, bibl. 11.

Among the progeny of crosses between commercial apple varieties and scab-resistant selections from 4 small-fruited *Malus* species are some seedlings which combine scab-resistance with fruit of good size and quality. Since some of these seedlings also show resistance to powdery mildew it seems possible that commercial varieties resistant to both diseases can be developed by back-crossing.—Canada Dep. Agric., Ottawa.

79. Pribavkina, R. A.
The selection of apple seedlings grafted before fruiting. [Russian.]
Agrobiologija, 1956, No. 3, pp. 114-16.

A comparison of the first fruits of hybrid apple seedlings with those of the scions of the same seedlings grafted into the crowns of various orchard trees showed that the stock affected size, time of ripening and flavour.

80. Lalatta, F.
Le odierne conoscenze sulla trasmissione dei caratteri ereditari nel pesco. **(The present state of knowledge concerning transmission of hereditary characters in peaches.)**
Riv. Ortoflorofruttic. ital., 1956, **40**: 255-70, bibl. 48.

Information is summarized for the following characters: tree shape; evergreen habit; leaf colour; leaf-gland shape; flower-bud production; cold resistance of flower buds, branches and trunk; flowering date and need for winter cold; pubescence of flower buds; flower type and size; pollen sterility; fruit-ripening date; texture and colour of fruit skin; colour of fruit pulp and associated foliar features; fruit weight; size and quality; stone size and adherence to pulp; resistance to nematodes; "varietal entities".

81. Kramer, S.
Beiträge zur Züchtungsforschung beim Pfirsich. 1. Untersuchungen zur Frucht- und Embryonalentwicklung bei Pfirsichsorten (*Prunus persica* L.). **(Contributions to research on peach breeding. 1. Investigations on development of fruits and embryos in varieties of *Prunus persica*.)**
Arch. Gartenb., 1956, **4**: 67-82, bibl. 18, illus.

Observations were made on 10 peach varieties with different ripening times. Differences in fruit swelling between early and late-ripening varieties were not dependent on temperature. Early varieties had the higher growth-increment index values. The duration of embryo development was dependent on variety and ripening date. Split stones and gum secretion occurred most frequently among early varieties with the highest growth-index values. There appears little possibility of combining early ripening with viability of seed by selective crossing.

82. Baldini, E.
Indagini e considerazioni su due casi di mutazione gemmaria nel pesco. **(Investigations and comments on two cases of bud mutation in peach.)** [English summary 6 lines.]
Riv. Ortoflorofruttic. ital., 1956, **40**: 300-10, bibl. 30, illus.

Trees of Charles Ingouf (locally known as Vincitore) and Palazzina varieties each produced a branch bearing smooth-skinned fruits. The mutations were proved constant by budding trials. The origin of nectarines is discussed.

83. Jakovlev, P. N., and Ostapenko, V. I.
Results of distant hybridization in stone fruits in connection with the activity of oxidising enzymes. [Russian.]
Agrobiologija, 1956, No. 3, pp. 11-14.
Ostapenko, V. I.
Results of inter-varietal crossing in sour cherries in connection with the activity of oxidising enzymes in the parent trees. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1956, **21**(5): 15-19, bibl. 6.

Polyphenoloxidase and peroxidase determinations were made on the leaves of *Cerasus besseyi*, *C. tomentosa*, *Prunus spinosa*, *P. triflora*, *Armeniaca vulgaris* and *Persica vulgaris*, which were then reciprocally cross-pollinated. The results, expressed in fruit and seed production, seed germination and fertility of the hybrids, were more satisfactory when the activity of the oxidising enzymes was higher in the male than in the female parent. Reciprocal cross-pollination of 5 varieties of sour cherries gave similar results. The possibility of increasing the activity of oxidising processes in pollinating varieties by means of manuring is considered.

84. Crossa-Raynaud, P.
Hybridation de l'abricotier. **(Hybridization of apricots.)**
Rapp. Serv. bot. agron. Tunis. 1955, 1956, pp. 182-92.

Results of two crossings are briefly reported. Pollen retained 20% viability after four months' storage in corked tubes containing $CaCl_2$ at −11° C. The problem of infection of embryo cultures is discussed. Contamination probably occurs during removal of the testa. Exposure of freshly gathered seeds to a temperature of 4° C. for 6 or 7 days following sowing increased germination percentage to 100. Seeds stored at 25–30° C. for two months increased their average germination percentage from 47 to 95 when exposed to 4° C. for one month after sowing.

85. Krümmel, H., Groh, W., and Friedrich, G.*
Deutsche Obstsorten. **(German fruit varieties.)**
Zentralstelle für Sortenwesen. Deutscher Bauernverlag. Berlin W.8, Am Zeughaus. 1956, 12 × 8 in., separate sheets, coloured plates, price not stated.

Considerable detail is given with coloured illustrations of the growth habit, of cultural needs, hardiness, etc., of 9 apple and 6 cherry varieties, and references are given to other sources of information outside Germany. One or two varieties fairly well known outside Germany, such as James Grieve, are included in this work emanating from East Berlin. It is not clear whether similar sheets will be issued dealing with other fruits.

86. Hoblyn, T. N.
The Isaac Newton apple.
Observatory, 1955, **75**: 134-5, bibl. 1.

The original tree associated with the discovery of the force of gravity is said to have died in 1814, but its graft progeny have survived and are being established as historic specimens in many places throughout the world. The variety is the Flower of Kent.

87. Gerritsen, C. J.
Improvement of the cherry varieties used in the Netherlands. [Dutch summary 1 p.]
Euphytica, 1956, **5**: 101-16, bibl. 12, illus.

Work on cherry improvement, conducted mainly at the Institute of Horticultural Plant Breeding, Wageningen, and discussed here, includes regrouping of the list of recommended varieties, collecting and studying varieties and seedlings from the Netherlands and abroad, type selection, and production of *Prunus avium* seedlings and of better Duke varieties.

Propagation and rootstocks.

(*See also* 60, 181j, p, q.)

88. Visser, T.
Some observations on respiration and secondary dormancy in apple seeds.
Reprinted from *Proc. kon. ned. Akad. Wetensch. Ser. C*, 1956, **59**: 314-24, bibl. 15.

Moist storage of non-after-ripened seeds at 25° C. brought about slight after-ripening in intact seeds, none of which germinated, and increased the respiratory activity and germinative capacity of embryos excised after increasing intervals. Similar treatment of excised non-after-ripened embryos and of partly after-ripened seeds induced dormancy. Dry storage of partly after-ripened seeds almost entirely prevented secondary
dormancy and increased germinative capacity w
followed by a 13-day stratification.—Lab. Tuinb
Wageningen.

89. Visser, T.
The growth of apple seedlings as affected by after-ripening, seed maturity and light.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C*, 1956, **59**: 325-34, bibl. 15, illus.

Lack of after-ripening induced low germination
centage in seeds and excised embryos, and dwar
and poor survival of the seedlings. A slight degre
after-ripening occurred at 25° C. Cold treatment
seedlings, preferably for a month in spring, reme
most cases of dwarfing due to absence or inadequac
after-ripening. The more mature the seeds at
vesting the shorter was the necessary after-riper
time and the higher the resistance to contaminat
Dwarfed and deformed seedlings were as numer
from early maturing as from later maturing varie
harvested on the same day 2 and 10–12 weeks resp
tively before maturity. Supplementary lighting
moted axial growth in seedlings from after-ripe
seeds and greatly increased growth and vitality of th
from non-after-ripened seeds. Where stunting
associated with complete dormancy manifested
formation of a terminal bud, cold treatment
generally effective in overcoming it, but light treatm
failed to stimulate further growth.—Lab. Tuinb
Wageningen.

90. D.S.I.R., New Zealand.
Supply of peach seed for nurseries.
A.R. D.S.I.R., N.Z., 1955–56, p. 16.

Severe brown rot infection on Golden Queen peac
had no adverse effect on the seed used for rais
rootstocks. Provided that the stones were not allo
to dry out, good germination and vigorous nor
seedlings were obtained.

91. Sharpe, R. H.
Observations on rooting softwood cuttings of peach.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 102-6, bibl. 2.

Rooting softwood cuttings of peaches under mist
rapid and successful when foliage was healthy
temperatures of the medium ranged between appro
mately 70° and 80° F. Use of 1,000 p.p.m. IBA
50% alcohol as a quick dip was beneficial. R
development and growth of trees grown from cutti
over a two-year period has been as satisfactory as
of seedlings or budded trees. [Author's summary.
Fla agric. Exp. Stat., Gainesville.

92. Crane, J. C., and Bradley, M. V.
Growth regulators on apricot.
Calif. Agric., 1956, **10**(10): 5, 14, illus.

Stratified apricot seeds from trees sprayed with gro
substances at the beginning of pit hardening gave
percentages of germination and viable plants. W
2,4,5-T higher concentrations gave increasingly inh
tory effects. The effect of 2,4,5-TP was even m
inhibitory than that of 2,4,5-T. Germination of se
from 2,4-D-sprayed trees was totally inhibited. Tr
ment with NAA reduced subsequent seed germina
and seedling growth but growth abnormalities

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* Colour prints by A. Schalin.

not induced. Some abnormality of growth was found in all lots of seed from trees sprayed with 2,4,5-T or 2,4,5-TP. Similar abnormalities were induced when seeds were treated with 2,4,5-T after stratification.

93. BRABEC, S.
Nová jednoduchá metoda masového množení nesnadno množitelných ovocných dřevin vegetativní cestou. (**A simple new method of large scale propagation of fruit trees difficult to propagate vegetatively.**) [Russian, English and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 701-14, bibl. 8, illus.

The method depends upon the ability of the plants to form adventitious buds on roots, and in this it resembles propagation by root cuttings. The author found that many root cuttings either do not survive or grow somewhat feebly, whereas by the method described, which avoids root disturbance until regeneration is completed, growth is vigorous. Rootstocks or young trees on their own roots are lifted when dormant, root pruned to leave main roots 4–6 in. long, and replanted some 30 in. apart. Shallow planting is advocated, with the upper parts of the main roots 3 in. or so above ground; these exposed roots are well mounded with soil to prevent their drying. At the end of July the mound is removed, exposing the roots to light to encourage the initiation of buds. The following spring the stem, with about 2 in. of the roots, is cut away and, when new roots have grown, is used for further propagation. The roots left in the ground produce vigorous shoots and in the autumn, 2 years from planting the mother tree, the new plants are lifted. These plants are vigorous and resemble seedlings in appearance. Some plum rootstocks, notably myrobalan, were too strong for normal use, and apricots, peaches and walnuts did not produce shoots, but a number of apples and plums, some cherries and *Pyrus ussuriensis* were very successful.

R.J.G.

94. BEAKBANE, A. B.
Possible mechanisms of rootstock effect.
Ann. appl. Biol., 1956, **44**: 517-21, bibl. 20.

After a brief consideration of certain rootstock effects and some relationships between anatomy and behaviour in rootstocks, five theories are presented which may help in explaining the mechanism of rootstock effect.

95. DICKSON, A. G., AND SAMUELS, E. W.
The mechanism of controlled growth of dwarf apple trees.
J. Arnold Arbor., 1956, **37**: 307-13, bibl. 14, illus.

Apple trees may be dwarfed and induced to fruit earlier by grafting them on a dwarfing rootstock or interstock, or by inverting a ring of bark on the trunk of the tree. The mechanism of these dwarfing effects was studied with the aid of radioactive tracers. Radioactive tracers were fed through the petioles of the leaves of the lateral branches of young trees. Several days later the distribution of the isotope in the trunk of the tree was determined with a Geiger counter and by autoradiographs of transverse stem sections. The great concentration of the isotope in the dwarfing interstock or in the inverted ring of bark indicates that the dwarfing effect may be caused by checking the flow of organic nutrients to the roots, but the mechanisms involved may be indirect and diverse. [Authors' summary.]

96. SAX, K., AND DICKSON, A. Q.
Phloem polarity in bark regeneration.
J. Arnold Arbor., 1956, **37**: 173-9, bibl. 8, illus.

The inversion of a ring of bark on the trunk of a tree results in checking phloem transport to the roots and dwarfing the tree. The effect is not permanent, because the new bark regenerated at the vertical seam is normally polarized and permits normal phloem transport. By grafting a ring of bark from an apple tree with red wood on a tree with white wood, it has been shown that the new bark and wood regenerated at the vertical seam of the grafted ring of bark is derived from the underlying wood and not from the adjacent bark. A double bark inversion, with the vertical seams on the opposite sides of the trunk, increases the duration of the dwarfing effect, but the lateral diffusion of nutrient sap soon results in a lateral orientation of the new xylem and phloem, to bridge the normally polarized tissues regenerated at the seams of the two inverted rings of bark. The nutrient sap may diffuse laterally or vertically if normal phloem transport is checked. If a strip of bark is removed from a tree, the exposed wood, if kept moist, will regenerate new dark and wood. It is shown that the new cambium is oriented in the long axis of the stem, regardless of the orientation of the surrounding grafted bark. [From authors' summary.]

97. HERRERO, J.
Incompatibilidad entre patrón e injerto. III.—Comparación de síntomas producidos por incompatibilidad y por el anillado del tronco. (**Incompatibility between stock and scion. III. A comparison of symptoms produced by incompatibility and by trunk girdling.**) [English summary 7 lines.]
An. Estac. exp. Aula Dei, 1956, **4**: 262-5, bibl. 8.

The effects of trunk girdling on peach and myrobalan trees are described and are shown to be very similar to the symptoms of incompatibility in the peach/myrobalan graft combination. The author discusses the theory that symptoms of incompatibility in the peach/myrobalan combination are related to a failure in the transport system. [For parts I and II see *H.A.*, 26: 2446.]

98. BIRD, I. F., AND RUCK, H. C.
Comparative physiology of apple rootstocks. II. The effect of pH and aeration on the growth of Malling apple rootstocks in water cultures.
Ann. Bot. Lond., 1956, **20**: 553-62, bibl. 11.

Three Malling apple rootstocks, M.IX, M.II, and M.XVI, were grown in aerated and non-aerated nutrient solutions at pH 3·6, 4·0, and 5·5, and their growth and survival compared with rootstocks grown in sand and in soil. No plants survived in the non-aerated cultures owing to severe bacterial and fungal attack on the roots. In the aerated series a marked difference in susceptibility of rootstocks to root infection was found, M.XVI being considerably more resistant than M.II or M.IX. More rootstocks survived at the lower pH's (4·0 and 3·6), but among surviving plants of M.XVI growth was much less than at pH 5·5. It would appear therefore that factors making for survival do not of necessity make for optimum growth. In sand and soil cultures all plants survived. [Authors' abstract.]—Imp. Coll., London. See also *H.A.*, 26: 2447. For Part I see *H.A.*, 26: 1416.

99. Friedrich, G.
Das Verhalten verschiedener Apfelstammbildner mit einigen Ertragssorten in Mitteldeutschland. **(The behaviour of various apple stem-builders with some scion varieties in central Germany.)**
Züchter, 1956, **26**: 289-307, bibl. 41, illus.

Examples are given of different effects of intermediates on scion varieties according to degree of compatibility. Data from trials in central Germany are given, in which growth on different intermediate stocks was compared in bush trees. It was shown that weak-growing and high-yielding varieties generally showed better development on seedling stocks than on M.XI. The most satisfactory intermediate was Hibernal, and Antonovka is also recommended. Yields varied with variety, but both these intermediates gave good results. In Ontario leaf assimilation was reduced in incompatible combinations. The nursery qualities and hardiness of the intermediate stocks are discussed. —Inst. Obst. u. Gemüseb. Martin-Luther-Univ., Halle-Wittenberg. [See also *H.A.*, 26: 1418.]

100. Sedov, E. N.
Increasing the vigour of apple hybrids. [Russian.]
Agrobiologija, 1956, No. 3, pp. 134-6.

Crosses of Siberian crab, reinettes or Kitajka [*Malus prunifolia*] with large fruited varieties were more vigorous than crosses between the large fruited varieties themselves. The Siberian crab × large fruited hybrids were especially vigorous and frost resistant, showing promise as rootstocks for the northern fruit growing areas. For the central areas, *M. prunifolia* × large fruited hybrids are generally considered to be the most satisfactory rootstocks.

101. Karnatz, H.
Untersuchungen über die Frostresistenz der Obstgehölze im Baumschulstadium. III. Über die relative Frosthärte unveredelter Kernobstunterlagen. **(Studies on the frost resistance of fruit trees in the nursery stage. III. The relative frost hardiness of ungrafted pome fruit rootstocks.)**
Züchter, 1956, **26**: 307-15, bibl. 13.

Seedlings of 9 apple and 11 pear varieties and 5 clonal apple rootstocks were given artificial cold treatment in the field. Of the apple seedlings Grahams Jubiläum, *Malus prunifolia*, Roter Trier and Bittenfelder Sämling were equally hardy. Many Littauer Pepping and Antonovka plants remained undamaged; mixed seedlings from a French source were most susceptible to frost. The most hardy clonal rootstock was A2 from Sweden. Kirchensaller Mostbirne was the most resistant of the pear varieties. The maternal par
was shown to be very important for frost resist
qualities. In general the correlation between grov
and frost-resistance was marked, but no relations
between time of leaf-fall and frost resistance
apparent.—Obstbauversuchsanst. Jork. [For part
and II see *H.A.*, 26: 3477 and 3478.]

102. Müller, H., and Stritzke, S.
Pillnitzer vegetativ vermehrte Birnenunterlagen. **(Vegetatively-propagated Pillnitz pear rootstocks.)**
Züchter, 1956, **26**: 339-41, bibl. 4, illus.

Seedlings of *Pyrus amygdaliformis*, *P. betulaefolia*
P. communis have been selected as pear rootstocks
Pillnitz. Good results have been obtained with t
vegetative propagation. In trials with several p
varieties no symptoms of incompatibility have
been observed.

103. Whittaker, E. C.
Pear root stocks in New South Wales.
Agric. Gaz. N.S.W., 1956, **67**: 226-37, illus.

During 25 years' trials of pear rootstocks in N.S
it has become obvious that the D6 strain of *P*
calleryana is in many respects equal, and in n
ways superior, to any other seedling stock tested.
easily raised from seed and as it flowers early i
unlikely to be cross pollinated. It is approxima
2–3% self fertile; the trees crop heavily at an early
and the hard fruits are easily stored for seed extract
It produces a good straight stem which can be be
grafted within 12 months. It is compatible with
common commercial varieties. Young trees proc
heavier crops of good quality fruit on it than on o
rootstocks. J.R.

104. Karnatz, H.
Das Verhalten der vegetativ-vermehrten Vogelkirsche F 12/1 in der Baumschule. **(The behaviour of vegetatively-propagated *P. avium* F 12/1 in the nursery.)**
Mitt. ObstVersuchsringes Jork, 1956, **11**: 166-72, bibl. 6, illus.

The behaviour of F 12/1 in the propagation beds
as a rootstock and stembuilder in the nursery
observed in several tests. Results were much b
with layering than with stooling. Growth of sc
and other qualities in the nursery were compar
to those of seedlings from Bremens Kirsche. F
resistance of ungrafted plants was about average
cherry seedling rootstocks. The advantage of u
this rootstock is that it is virus-free.

Growth phenomena.

(*See also* 181h.)

105. Blair, D. S., MacArthur, M., and Nelson, S. H.
Observations in the growth phases of fruit trees.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 75-9, bibl. 15.

A review of the literature is followed by observa
made at Ottawa in the last 20 years on apple and
seedling juvenile and mature growth.

106. Smeets, L.
A note on the shortening of the juvenile phase in cherry seedlings. [Dutch summary 8 lines.]
Euphytica, 1956, **5**: 117-18, bibl. 2.

Seedlings of Limburgse Boskriek cherry were grown in a phytotron in an attempt to induce them to complete more than 1 growth cycle per year. It was shown that the yearly cycle could be reduced to about 6 months. Two-year-old seedlings which had completed 3 or 4 growth cycles were planted out-of-doors with the controls in spring 1955. In spring 1956 all the controls flowered, whereas only 1 of the treated plants flowered. The failure of the treatment to shorten the juvenile period is in contrast to the results of Potapenko [see *H.A.*, 10: 1310]. A fuller account of the work is to be published later.—Inst. hort. Plant Breed., Wageningen.

107. Lake, J. V.
The effect of microclimatic temperature upon the date of flowering of the apple.
J. hort. Sci., 1956, **31**: 244-57, bibl. 11, illus.

1. Microclimatic differences between sites having high (site X) and low (site Y) night temperatures were sufficient to cause delay in the spring growth of both vegetative and flower buds of dwarf apple trees at site Y. After flowering, however, the trees at this site became the more advanced in vegetative growth for a short period, but the difference subsequently disappeared. 2. By interchanging the trees between the two sites it was found that the difference in date of flowering appeared to relate as closely to the temperature treatment during the previous growing season as to the spring temperatures in the current year. Thus the delay was more marked in the second year spent at site Y than in the first. 3. In the spring, night minimum temperatures and accumulated temperatures below 42° F. appeared to be more important in determining the date of flowering than day maxima or accumulated temperatures above 42° F. The latter differed little from site to site. 4. Trees of Cox's Orange Pippin which spent the early part of the spring at site X and were subsequently moved to site Y on 11th March were more delayed than trees which spent the entire spring at the "cold" site Y. Trees of Worcester Pearmain were not affected by such treatment. 5. The response to these microclimatic temperature differences was generally more marked in Cox's Orange Pippin than in Worcester Pearmain. The delay in flowering of the former variety at site Y amounted to 10–12 days in 1955. 6. Spring growth of flower buds in Worcester Pearmain started late and proceeded more rapidly than in Cox's Orange Pippin. 7. Siting trees at Y in one year appeared to decrease the number of flower buds carried in the following spring. [Author's summary.]—Univ. Reading.

108. Bac, S. M.
Próba określenia wpływu temperatury na fenofazy drzew owocowych. **(An attempt to determine the influence of temperature on the phenophases of fruit-trees.)**
Melioracja, 1956, **1**(3): 60-84, bibl. 19.

Observations were made on 6 pear varieties. Five phases were distinguished. During the period 1952-4 there were considerable differences in time and duration of these phases. Temperature did not seem to be correlated with the bud development when expressed as sums of mean daily air temperatures for individual phenophases. A thermic factor, however, was found which was similar for phases in the very different spring seasons of 1952-4. It is expressed as a sum of hours above a given air temperature, specific for each phase and calculated from thermograph charts (the thermograph was placed in a screen at 2 m.). The first phase seems to be affected not by the air but by the soil temperature. This phase begins when the thermoisopleth in the whole soil profile reaches 3° C. The phases 2–5 are affected by air temperature. The sum of hours above threshold temperatures for each of the 6 pear varieties is given in table 3. The higher values for 1953 are thought to be due probably to slight frost damage.

I.M.

109. Nesterov, Ja. S.
Dormancy in fruit trees. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **108**: 738-41, bibl. 10, illus.

Apple, plum and peach trees brought indoors on February 25 soon began to grow and flowered at the end of March, while on similar trees overwintering indoors at 15–20° C. flowering and foliation were delayed by 2–3 months. Non-winter chilled apple and plum scions grafted in the crown of young and bearing winter chilled trees did not grow; those grafted on trees with one half of the crown removed gave slow growth, and those grafted on stumps of 8- to 15-year-old trees showed a high percentage of take and good growth. Winter chilled apple, plum and peach scions grafted on non-winter chilled rootstocks showed a high percentage of take but very poor growth.

110. Dragavcev, A. P.
Retardation of fruit ripening in connection with increasing altitude. [Russian.]
Bot. Žurnal, 1956, **41**: 416-17.

In Zaili Ala-Tau 2 important apple varieties ripened 3·3–3·5 days later for every 100 m. rise in altitude between 700 and 1,400 m., and 5·0–5·7 days later for every 100 m. rise between 1,400 and 1,680 m. The comparative figures for a pear variety were 3·3 and 6 days, while in a strawberry variety ripening was delayed by 2·3 days per 100 m. between 700–1,400, 3·6 days between 1,400–1,680, and 5·6 days between 1,529–2,254 m.

111. Barton, L. V.
Growth response of physiologic dwarfs of *Malus arnoldiana* Sarg. to gibberellic acid.
Contr. Boyce Thompson Inst., 1956, **18**: 311-17, bibl. 16, illus.

Lanolin preparations or aqueous solutions of gibberellic acid have been found to promote the growth of physiologic dwarfs produced from non after-ripened embryos of *Malus arnoldiana*. Such growth is characterized by the extension of internodes, resulting in the elimination of the dwarfed condition. The number of leaves and nodes were not affected by the chemical under the conditions of the present tests. This is the first chemical shown to induce extended growth of physiological dwarfs. [Author's summary.]

112. QUAAS, R.
Langlebige Kulturen im Blickfelde der "Anwelkmethode" unter besonderer Berücksichtigung der Schattenmorelle und des Apfels. (Vorläufige Mitteilung.) **(Perennial crops in relation to the "wilting method", with special reference to Morello cherry and apple. (Preliminary report.))**
Arch. Gartenb., 1956, **4**: 112-17, bibl. 11, illus.

The "wilting" method of determining relative transpiration, hitherto used for annual crops, was applied to cherry and apple as soon as possible after flowering. Transpiration was markedly higher in apple than in Morello cherry. Application of sewage water raised relative transpiration and reduced yield in cherry. In apple there was an inverse relationship between transpiration and yield.

113. SCHMADLAK, J.
Sortierung von Obstbaumstämmen. **(Grading of fruit tree trunks.)**
Dtsch. Gartenb., 1956, **3**: 260-2, illus.

Two types of graded gauge are described which are used for quick measurements of trunk diameter in young fruit trees.—Inst. Gartenbau, Dresden.

114. GRIGGS, W. H., AND IWAKIRI, B. T.
A comparison of methods of obtaining growth curves of Bartlett pears.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 91-4, bibl. 8.

The authors conclude that when growth curves are used to show the relative effects of experimental treatments they can be obtained either by measuring the same fruit at given intervals or by picking the fruit at random from the same tree at the same intervals and measuring successive samples, and that the small inconsistencies in fruit length, diameter and weight associated with the second method are of little practical significance.—Univ. Calif., Davis.

Pollination.

(*See also* 65, 67a.)

115. PRIOL, J.
Biologija cvetja, oplodbe in rodnosti pri jablani; študij in raziskovanja v Mariboru. **(Studies on the biology of flowers, pollination and fertility in apples at Maribor.)** [English and German summaries 2½ pp. each.]
Zborn. Kmet. Gozd., Ljubljana, 1956, No. 2, pp. 261, bibl. 255, illus.

This paper gives the results of work carried out from 1947 to 1954 at the Fruit Research Institute, Maribor. In studying compatibility the difficulties arising from the variability of varietal genotypes is pointed out. There appears to be a negative correlation between pollen vitality and age of the variety. Environmental factors, in particular climate, and the effects of photoperiodism are examined, and the breaking of dormancy, flower development and the success of pollination are discussed. The endosperm is stated to be the source of syngamin, a hormone of special significance for embryo development, fruit set and drop. While data confirming the importance of bees for pollination were obtained, experiments showed that, except in a cases, artificial pollination was more success Reference is made to the control of biennial bearing cultural and growth substance treatments. Most the paper is devoted to pollination experiments and results of 605 combinations with 44 varieties tabulated. A "pollination coefficient" is introduc

$$\frac{\text{No. of ripe fruits}}{\text{No. of pollinated blossoms}} \times \frac{\text{No. of viable se}}{\text{Total No. of se}}$$

This is claimed to be the first mathematical express of this characteristic and forms the basis on wh suitable pollinators for each of the 44 varieties h been selected. Other tables show the flowering d of 54 varieties grown at the Institute and the viab of the pollen of 90 varieties. In conclusion variation in the period required from flowering maturity of 10 varieties between 1930 and 194 discussed.

116. BREVIGLIERI, N., AND BALDASSARI, T.
Ricerche sull'impollinazione del pero nel Ferrarese. **(Pear pollination studies in the Province of Ferrara.)** [English summary ¾ p.]
Ann. Sper. agrar., 1956, **10**; 1345-82, bibl. 9, illus.

The results of self and free pollination are recorde 25 varieties and the results of various cross pollinat for 22 of these. The most successful pollinators listed. In varieties in which parthenocarpy occu in 1953 it was reduced or even absent in 1954. In weather the temperature inside the special paper used for isolation of flowers was higher than tha thick gauze bags and parthenocarpy was more com in the former. In general fruit set was higher f artificial than from natural pollination.

117. DE SONNAVILLE, P.
Metaxenien? De slechte invloed van het stuifmeel (van twee krozen en twee Japanse pruimen) op de ontwikkeling can de vruchten van Early Laxton. **(Metaxenia? The poor effect of pollen (of 2 hybrids and 2 Japanese plums) on the development of fruits of Early Laxton.)**
Fruitteelt, 1956, **46**: 904-6, illus.

Pollen of June Blood, Hollywood, an unknown hybrid and Vroege Oranje, used to pollinate Laxton, resulted in smaller fruit than pollen of *Pr* *domestica* varieties. The author considers that smaller fruit size corresponds to the reduced nu of chromosomes in the embryo resulting from cro a diploid variety (with 16 chromosomes) with Laxton (with 48 chromosomes).

118. ROBERTS, D.
Sugar sprays encourage fertilisation by honey bees.
Orchard. N.Z., 1956, **29**(8): 2, 5, 7, 9.

In Auckland several plum varieties have been sp during flowering with sugar solution to make them attractive to bees. Concentrations of 20–25% satisfactory if there is no competition from plants, but where there is competition higher co trations may be required. Sprays should be ap twice daily from about 75% full bloom to 20%

fall. It is only necessary to spray one good-sized fruiting arm on every alternate tree.

119. Kostina, K. F., and Domanskaja, E̊. N.
Experiments on self-pollination of apricots. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1956, **21**(5): 12-14.

Self-pollination was studied at the Nikitskij Botanical Garden, Yalta, in 5 Central Asian and 4 Iranian-Caucasian, mainly self-sterile, apricot varieties and in hybrids of these varieties with self-sterile European varieties. The results are tabulated.

Spraying for cultural purposes.

120. Davison, R. M.
The use of chemical thinning sprays on apple trees in New Zealand. III. Effect on fruit storage life.
N.Z. J. Sci. Tech., Sect. A, 1956, **38**: 34-40, bibl. 4.

Two chemical thinning treatments, with DNOC or α-NAA, were applied to 5 apple varieties, and their effect on fruit behaviour in cool storage was observed. Fruit from Sturmer trees thinned with NAA at 100% petal fall showed in some experiments a greater incidence of internal breakdown than fruit from unsprayed trees or from DNOC-sprayed trees [see *H.A.*, 25: 1329]. Fruit from Sturmer thinned at full-bloom with DNOC in general stored as well as fruit from unsprayed hand-thinned trees. Storage life of Jonathan, Dougherty, Statesman and Dunn's Favourite was not markedly affected by treatments, although in some cases there was a higher incidence of internal breakdown and coreflush. Losses caused by internal breakdown in fruit from Sturmer trees thinned by NAA were reduced by early picking.—D.S.I.R., Auckland. [For Parts I and II see *H.A.*, 25: 2460 and 559.]

121. Davison, R. M.
The use of chemical thinning sprays on apple trees in New Zealand. IV. Compatibility of growth substances with therapeutant sprays.
N.Z. J. Sci. Tech., Sect. A, 1956, **38**: 41-4, bibl. 6.

Alphanaphthaleneacetic acid (ANA) and alphanaphthaleneacetamide, applied alone or mixed with therapeutant sprays, were tested as thinning agents on Jonathan applies in Nelson. ANA was effective and caused no additional foliage injury when combined with one or several of the following: lime sulphur, colloidal sulphur, phenyl mercury chloride, thiram, ferbam, captan, lead arsenate, summer oil, DDT, DDD, hydrated lime. ANA tended to be more effective when applied with therapeutants than when applied alone. The acetamide achieved more thinning mixed with summer oil than applied alone, although the increase in effectiveness was not significant. [Author's summary.]—D.S.I.R., Auckland.

122. Edgerton, L. J., Hoffman, M. B., and Smock, R. M.
Control of the preharvest drop of McIntosh apples with 2,4,5-trichlorophenoxyacetamide.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 58-62, bibl. 3.

In 3 years' trials at Kinderhook, N.Y., 2,4,5-T amide was more effective in controlling preharvest drop of McIntosh than either 2,4,5-T or 2,4,5-TP. It had, however, a tendency to hasten maturity and to cause softening of the fruit. This tendency was partly overcome without effecting abscission control by adding maleic hydrazide to the spray.—Cornell Univ., Ithaca.

123. Mattus, G. E., Moore, R. C., and Rollins, H. A., Jr.
Preharvest growth regulator sprays on apples. II. Drop and maturity for 1954 and 1955.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 63-7, bibl. 7.

In 1954 applications of 2,4,5-TP and 2,4,5-TA were about equally effective on all varieties of apple except Golden Delicious. Only in Stayman apples was a softening effect observed. In 1955 2,4,5-TP was the more effective. A softening effect was noticeable in Red Rome plots. [For part I see *H.A.*, 25: 3563.]

124. Davison, R. M.
Effect of various growth-regulating substances on fruit drop and storage life of apples.
N.Z. J. Sci. Tech., Sect. A, 1956, **38**: 45-51, bibl. 16.

Alphanaphthaleneacetic acid (NAA) at 10 p.p.m. and 2,4,5-trichlorophenoxypropionic acid (2,4,5-TP) at 20 p.p.m. effectively controlled drop on Jonathan and Delicious. Results with 10 p.p.m. 2,4,5-TP and 10 p.p.m. alphanaphthaleneacetamide on Jonathan, and with Fruitone at 8 oz./100 gal. on Delicious, were in general comparable to those obtained with NAA. 2-methyl-4-chlorophenoxyacetic acid at 10 p.p.m. and 2,4-dichlorophenoxyacetic acid at 10 p.p.m. were less satisfactory than NAA, while 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) at 10 p.p.m. and 20 p.p.m. had no significant effect on drop. Spraying with NAA at 10 p.p.m., its amide at 10 p.p.m., and 2,4,5-TP at 20 p.p.m. on Cox, Jonathan, Granny Smith and Sturmer had no significant effect on the percentage of commercially sound fruit recorded after cool storage. On Gravenstein 2,4,5-TP at 20 p.p.m. and 2,4,5-T at 20 p.p.m., in comparison with NAA at 10 p.p.m., did not increase losses in cool store.—D.S.I.R., Auckland.

125. Whitwell, J. D.
It seems to work. Trials with 245 TP for ripening Worcesters in northern England.
Comm. Gr, 1956, No. 3170, p. 705.

In small-scale trials in Yorkshire sprays of 2,4,5-TP have resulted in highly-coloured fruits about a fortnight earlier than is normal.

126. Poapst, P. A., and Phillips, W. R.
The influence of maleic hydrazide on the keeping quality of McIntosh apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv., 1955*, 1956, p. 1.

Crops from 3 similar McIntosh trees, 2 of which had been sprayed with MH, were picked a week after spraying and stored at 32° F. for 7 months. Examination after storage showed that fungal wastage and breakdown were reduced by MH sprays but the incidence of core flush was increased. At harvest it was noted that pre-harvest drop was substantially reduced by MH sprays.—Centr. exp. Fm, Ottawa.

127. Griggs, W. H., Harris, R. W., and Iwakiri, B. T.
The effectiveness of growth-regulators in reducing fruit loss of Bartlett pears caused by freezing temperatures.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 95-101, bibl. 4.

Aqueous sprays of 2,4,5-TP and of 2,4,5-T at concentrations ranging from 10–40% showed promise in reducing fruit loss of Bartlett pears exposed to frost during or a few days after the flowering period. Studies suggest that more benefit would be got from the sprays if they were applied before a frost, or failing that immediately after it.—Univ. Calif., Davis.

128. Crane, J. C.
The comparative effectiveness of several growth regulators for controlling preharvest drop, increasing size and hastening maturity of Stewart apricots.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 153-9, bibl. 7.

Aqueous sprays containing 100 p.p.m. of 2,4,5-T, 2,4,5-TP, 2,4-D amd NAA applied to the Stewart apricot at the initiation of pit hardening reduced preharvest fruit drop due to seed abortion to 3·98, 3·19, 3·08 and 13·92% respectively. Comparable trees that were not sprayed dropped 24·14% of their fruits. Fruit maturity was hastened about one week, the earliest being obtained with NAA, followed in order by 2,4,5-TP, 2,4,5-T and 2,4-D. Diameter and fresh weight per fruit were increased from 11 to 14 and from 12 to 35% respectively by the growth regulators; the greatest increases were obtained with 2.4.5-T. Only following NAA and 2,4-D were there persisting adverse effects on the vegetative parts of the trees. Fruit cracking was significantly increased by 2,4,5-TP and significantly decreased by NAA. 2,4,5-T is recommended for commercial use. [From author's summary.]—Univ. Calif., Davis. [See also *H.A.*, 26: 2482.]

Pruning and training.

(*See also* 181b, d.)

129. Jankiewicz, L.
The effect of auxins on crotch angles in apple trees.
Reprinted from *Bull. Acad. polon. Sci., Cl. II*, 1956, **4**: 173-8, bibl. 11, illus.

Unpruned maiden trees of McIntosh had crotch angles averaging 78° in the lower stem section, 73° in the middle section and 57° in the upper section. Ringing of young McIntosh trees before bud break caused weak shoots with wide crotch angles to grow out above the ring, while vigorous shoots with acute crotch angles were produced from below the ring. In another experiment a bud left between 2 rings produced a vigorous shoot with an acute crotch angle, indicating that growth and crotch angle are regulated by auxins transported from above. Applications of auxin at 3 concentrations in lanolin paste to bark rings on Starking trees reduced the effect of ringing on branches below the ring, the effect being in proportion to auxin concentration. Incomplete bark rings were remo
from Macoun trees leaving a strip of bark 2 mm.
intact either immediately above the first bud below
ring or 2 to 3 mm. to one side. The shoot angle w
the bark was intact above the bud was 74·5°, but
only 54·3° when the intact strip was at the side ab
the bud.—Dep. Pomol. Skierniewice, School
Agriculture, Warsaw.

130. Scaramuzzi, F.
Ricerche sull'epoca della potatura invernale
di produzione del pesco. **(Investigations on the time of winter pruning for peach production.)**
Reprinted from *Frutticoltura*, 1955, **17**(5),
pp. 4, illus.

Whole trees and different sections of the same tree
pruned at various dates from November until
April. The date of bud opening and the duratio
flowering were independent of pruning date,
vigour and production were adversely affecte
pruning after the beginning of flowering.

131. Schneider, G. W., and Correll, F. E.
Peach pruning studies in the North Carolina sandhills.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 144-52.

Three degrees of pruning were applied to Dixired
Redhaven trees growing on a lakeland sand
results differing somewhat between varieties.—
State College, Raleigh.

Nutrition, manuring and soil managemen

(*See also* 8, 9, 71, 181d, i, 548.)

132. Watanabe, R.
Studies on absorption of nutrient solution by fruit trees. [Japanese, with English summary
$\frac{2}{3}$ p.]
J. hort. Ass. Japan, 1956, **25**: 125-32, illus.

Root absorption of pigment solutions was studi
fruit trees. Each solution was translocated fr
root to its respective branches without mixing i
trunk. Branch vigour was related to the size
root supplying it. The translocation rate o
pigment was faster in longer and thicker branche
in short and thin branches. Where the branch
was small the rate of translocation was rapid. Pi
translocation was slowed down when branches
pruned in proportion to the degree of cutting b

133. Belavin, Ju. A.
Translocation of phosphorus from a latera root to the branches of grafted apple tree and of those grown on their own roots
[Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **108**
955-7, bibl. 1.

P^{32} was applied to a lateral root of 3- and 16-ye
apple trees grown on their own roots (seedling
4- and 17-year-old grafted trees. In the seedlin
radioactive P was found only in the leaves of the l
or branches above the treated root, while in the g
trees radioactive P was found in the leaves
branches. The results indicate that in seedlin
there is a determined anatomical and physio
connection between individual roots and branch

peach root (or group of roots) supplies minerals to a specific area of branches. In grafted trees, probably as a result of the union of the tissues and the removal of the stem of the rootstock, a connection is established between all branches of the scion and every root of the rootstock.

134. Harley, C. P., Regeimbal, L. O., and Moon, H. H.
Absorption of nutrient salts by bark and woody tissues of apple and subsequent translocation.
Proc. Amer. Soc. hort. Sci., 1056, **67**: 47-57, bibl. 5.

The findings of Tukey *et al.* [*H.A.*, 23: 211, 212] that dormant apple trees could absorb and transport nutrients were not confirmed. In the work here described the thin suberized cuticular bark layer effectively resisted the penetration of aqueous salt solutions while the trees were dormant and the bark unbroken. Absorption of nutrients by normal bark tissue was detectable only when entrance was provided through longitudinal bark cracks, transverse splits in leaf scars and lenticel ruptures resulting from growth. Radiophosphorus was absorbed at once by pruning cut wounds and translocated during the early foliation period. In this connection the authors point out that the best recovery from zinc deficiency in commercial apple and pear orchards was obtained when zinc sulphate sprays were applied *after the completion of pruning*. "Bark feeding" with major elements is probably of academic interest only, but the amount of microelement absorbed by microelement "bark feeding" might be adequate to cure, say, zinc deficiency. —U.S.D.A., Beltsville, Md.

135. (Harley, C. P., Regeimbal, L. O., and Moon, H. H.)
When to bark feed.
Agric. Res. Wash., 1956, **5**(3): 11, illus.

When urea, potassium acid phosphate, di-ammonium phosphate and rubidium chloride were applied as sprays to apple during the dormant season the nutrients entered only through pruning and other wounds. When they were applied in early April, however, after the flower buds had begun to open substantial amounts entered through the bark. Scraped or cut surfaces absorbed more materials and frozen wood somewhat less than normal bark.—Agric. Res. Center, Beltsville, Md. J.R.L.

136. Kenworthy, A. L., Miller, E. J., and Mathis, W. T.
Nutrient-element analysis of fruit tree leaf samples by several laboratories.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 16-21.

Uniform samples of apple, cherry, citrus and peach leaves were analysed by 16 laboratories. Routine chemical, flame, and spectrographic procedures were used to determine 12 nutrients. A comparison of the results showed good agreement for nitrogen, phosphorus, potassium, calcium and magnesium. The results for manganese, copper, boron, iron, zinc, sodium and aluminium did not show satisfactory agreement between laboratories. Sodium data were more variable than were the data for other nutrients. [Authors' summary.]—East Lansing, Mich., and New Haven, Conn.

137. Stolle, G.
Einjährige Untersuchungen über den Nährstoffgehalt der Blätter von Apfelbäumen verschiedener Sorten, Unterlagen und Standorte. **(One-year studies on the nutrient content of leaves from apple trees of different varieties, rootstocks and locations.)**
Arch. Gartenb., 1956, **4**: 151-64, bibl. 19.

The experiment involved 4 varieties, 2 rootstocks and 4 localities. Leaf analyses were made for N, P_2O_5, K and Ca. For all 4 nutrients there were significant differences due to locality. Significant varietal differences occurred only for N and K. Differences due to rootstock were not significant. The use of frequency-distribution curves from results for individual trees is discussed as a possible indication fo the nutrient status for a given locality.

138. McClung, A. C., and Lott, W. L.
Mineral nutrient composition of peach leaves as affected by leaf age and position and the presence of a fruit crop.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 113-20, bibl. 4.

Data are given showing changes in composition of tagged leaves between June 7 and September 20 in peach trees bearing a full crop and similar trees with the crop removed early in the season as regards N, P, Zn, Cu, K, Ca, Mg, Mn, Fe and B. Further, in a second group of bearing trees figures are given of the element content of basal, mid-shoot and terminal leaves. Implications of results are discussed in terms of sampling methods and interpretation of analytical data.—N.C. State Coll., Raleigh.

139. Dotti, F., and Ronzoni, G. L.
L'analisi delle foglie come guida alla concimazione del pesco. **(Foliar analysis as a guide to the fertilizing of peaches.)** [English summary 1 p.]
Ann. Sper. agrar., 1956, **10**: 1609-50, bibl. 37.

Foliar analyses from peach trees in excellent condition growing in fertile soil led to the adoption of the following nutrient values (in mg./atoms per 100 g. of dry matter) as indicating no necessity for fertilizers: $N = 238–251$; $P = 6$; $K = 57–75$; $N + P + K = 301–332$. Peach-leaf analyses from an area of poor soil showed deficiencies of N and K, the latter being enhanced by application of N. The diagnosis was confirmed by marked responses to $N + K$ in both fruiting and vegetative growth.

140. Satō, K., Ishihara, M., and Harada, R.
Studies on leaf analysis of fruit trees. III. Parts 9-12. [Japanese, with English summaries 2½ pp.]
Bull. nat. Inst. agric. Sci. Hiratsuka, Ser. E, 1955, No. 4, pp. 145-216, bibl. 80, illus.

Part 9. Leaf analysis in peach orchards. The minimum figures for chemical composition of leaves from a healthy orchard are considered to be 3·37% N, 0·20% P, 1·46% K, 1·75% Ca and 0·35% Mg. The composition of the leaves varies during the season but is stable at the end of June. No relationship was found between the amount of fertilizer used and leaf composition except with K. There was less N and K in leaves of younger trees. There was no relationship between yield and chemical composition of leaves, but N, P and K contents tended to decrease and Ca to increase with increasing yield. There was a positive correlation between N and P contents in leaves and a negative correlation between K and Mg. *Part 10. The effects of various amounts of nitrogen, phosphorus and potassium on growth and leaf composition in young peach trees (sand culture).* The mineral composition of leaf, shoot, trunk and roots increased in proportion to the concentration of the nutrient solutions. The leaves were found to be most useful in evaluating the nutrient status of the peach trees. *Part 11. The effects of various amounts of nitrogen, phosphorus and potassium on growth and leaf composition of young grape vines (sand culture).* As with peach trees the mineral composition of the plants changed in proportion to the concentration of the nutrient solution. The leaves were most sensitive to N variations but the petioles to K and P. *Part 12. Studies on the deficiency of mineral nutrients in grape vine, Japanese persimmon, peach, chestnut and apple.* The percentages of N, P, K, Ca and Mg in leaves showing signs of deficiencies are recorded from experiments carried out on seedlings grown in sand culture. [For Parts 1–4 and 5–8 see *H.A.*, 24: 1208 and 25: 2465.] J.R.L.

141. BEEFTINK, W. G.
Bemesting van appelbomen. Ervaringen met enkele Zeeuwse bemestingsproefvelden.
(Manuring of apple trees. Experience with trial plots in Zeeland.)
Fruitteelt, 1956, **46**: 846-8, illus.

Under conditions in Zeeland 80–100 kg. N per hectare gave the best results with 10- to 15-year-old Cox trees growing in a good moisture-holding soil with a short grass and clover cover. In drought-susceptible soils N had less effect. Lime, phosphate or potash applications produced little response on either of these soils.

142. BURRELL, A. B., BOYNTON, D., AND CROWE, A. D.
Boron content of apple in relation to deficiency symptoms and to methods and timing of treatments.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 37-46, bibl. 17.

Studies at Cornell in 1940–42 and 1950–52 are here summarized. Annual applications of boron compounds to the soil below the trees increased the boron-content of the leaves by 138% one year and 200% another. Such annual soil treatments increased the boron content in fruits on boron-deficient trees by about 400%. Autumn and early spring applications were equally effective when made in a band round the trees but less so when broadcast over the whole area. Foliage sprays caused a more immediate effect which, however, tended to wear off unless repeated. In the fruits endocarp and skin were highest and the outer part of the floral tube was lowest in boron. Boron content was inversely related to the N level of apple leaves. Data are given on boron content in leaves of trees from representative New York orchards.

143. MCGEORGE, W. T., AND BREAZEALE, E. L.
Application of the Neubauer technique and applied potential to the study of immobilization of iron in plants.
Soil Sci., 1956, **82**: 329-36, bibl. 9.

Polarographic treatment was carried out for 14
on branches of normal and chlorotic peach tr
There was no deflection in the polarogram for
normal branch, but that for the chlorotic bra
showed a major break at the half-potential for Fe
lesser breaks at the half-potentials for Cu and
The magnitude of the breaks decreased with time
normal green colour was present in the chlor
leaves after 14 days. Leaf analysis showed that du
the treatment "active" total iron increased from
to 40% in green leaves and from 23% to 46%
chlorotic leaves.

144. OLAND, K., AND OPLAND, T. B.
Uptake of magnesium by apple leaves.
Physiol. Plant., 1956, **9**: 401-11, bibl. 15.

No visual damage to apple leaves was observed
spray applications of 5% magnesium sulphate solu
There was no indication that the absorbed Mg
translocated to other plant parts. Absorption ap
ed to be little affected by soil water conditions,
rewetting of the sprayed leaves did not increase
uptake. Mg was readily absorbed by young le
but the hour of spraying seemed to be importan
rapid absorption. Absorption by old leaves
sprayed during the day was slight, but when spr
just before darkness large amounts of Mg
absorbed. Preliminary experiments have shown
large amounts of Mg are absorbed when Mg is ap
during the day as a solution of the salt of acetic
but the value of this treatment may be limited b
damage. In 2 of the experiments there was a su
drop in the Ca content of the leaves, which occ
shortly after spraying but before any signi
increase in Mg content was observed. Some
Ca lost by the leaves was rediscovered on the
surface.—Ullensvang Res. Stat., Lofthus, Hardan

145. CHITTENDEN, E.
Use of molybdenum in Nelson orchards.
Orchard. N.Z., 1956, **29**(7): 2, illus.

Apple, pear and lemon trees were given soil dre
of sodium molybdate at rates up to 2 lb. per
After 2 years apple trees showed some slight b
from the Mo treatment. Growth and roo
resistance of the lupin cover crop, however
markedly improved by Mo applications.

146. BOYNTON, D., AND ANDERSON, L. C.
Some effects of mulching, nitrogen fertiliza
tion, and liming on McIntosh apple trees, an
the soil under them.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 26-3
bibl. 3.

The general effects of mulching in a vigorous
orchard on reasonably well drained, deep soil
4-year period in which only one late summer d
occurred were similar to and additive to th
nitrogen fertilization. Leaf analyses indicat
complexities of the effects of the three treatmen
their limitations. There was a net gain in the
only of N and K as a result of mulching, of N a
as a result of N applications and of Mg as a re
liming. The soil analyses also show the comple
the effects of the three treatments. Where some
is found in increased amount in the soil it by no
follows that the leaves will show a like increase.

147. Hansen, E.
Sagflisdekking av jorda til hagebrukskulturer. **(Sawdust mulching of horticultural crops.)**
Årsskr. PlSkoledr. Dendrol., 1956, pp. 47-54, illus.

Data are presented on the effect of a 5 cm. and a 12 cm. sawdust cover on the depth of ice in the soil, on the number of weeds per square metre, on soil temperature and on soil moisture. The trials were carried out in the fruit tree nursery of the Norwegian College of Agriculture. The growth responses of currant cuttings to 5 cm. sawdust and peat mulches, with and without nitrogen, were also compared, peat proving inferior.

148. Löhrke, L.
Bodenfeuchtigkeit in Obstanlagen mit und ohne Gründüngungsanbau. **(Soil moisture in orchards with and without green manuring.)**
Arch. Gartenb., 1956, **4**: 93-111, bibl. 21, illus.

In a 2-year experiment in an apple orchard soil moisture content did not differ widely between clean-cultivated and green-manured plots, but was slightly lowered where the green-manure crop was rape plus hairy vetch. Reduction of available moisture by this crop or by lupins in autumn is favourable to the trees in seasons of moderate or heavy rainfall. Soil structure was improved and erosion checked by leaving the mown crop as a mulch for 10–12 weeks in spring before discing in.

149. Veihmeyer, F. J., and Hendrickson, A. H.
Does transpiration decrease as the soil moisture decreases?
Trans. Amer. geophys. Union, 1955, **36**: 425-8 and discussion 429-48, illus., from abstr. in *Biol. Abstr. Sect. D*, 1956, **30**, No. 23853.

This paper gives results obtained from a prune tree and from a pine tree grown in a suspended tank that permitted the obtaining of a continuous record of moisture loss from the soil. Additional results from field trials with pine, oak and manzanita on a watershed area and from apricot and prune trees under cultivation show that the rate of moisture extraction from the soil is not influenced by the water in the soil so long as the latter is above the permanent wilting percentage.

150. Snyder, J. H., and Weeks, D.
Soil productivity ratings in economic analysis.
Soil Sci., 1956, **82**: 101-16, bibl. 10.

Yellow Newtown apples were used as the test crop. Relationships of yield to each of the variables (soil profile factor A, soil texture and orchard age) are analysed graphically and combined into 3-dimensional graphs. The relevant mathematical formulae are discussed.

151. Hulshof, H. J., and van Lier, P. J.
Invloed van de grond op de ontwikkeling van enkele appelrassen en -onderstammen. **(The influence of soil on the development of some apple varieties and rootstocks.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1956, **19**: 723-31, illus.

The growth of several apple varieties on different stocks was related to soil type in studies in Limburg [Holland]. On soils which tend to become too dry Jonathan, Yellow Transparent and James Grieve, especially on vigorous rootstocks, gave good results. Belle de Boskoop, Cox's Orange Pippin and Manks Codlin were not suited to such soils. Soils which were liable to become rather wet were less suited to Yellow Transparent and James Grieve, but Jonathan, Belle de Boskoop, Manks Codlin and, to a certain extent, Cox's Orange Pippin gave good results on these soils.

152. Rodriguez-Ortiz, S. J., and Crosby, E. A.
A survey of the influence of equipment traffic on root concentrations and water infiltration in apple orchards.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 22-5, bibl. 16.

Data were obtained from 23 apple orchards in New Jersey. All orchards showed signs of compaction effects and a significant reduction in root concentrations was found in the upper foot of soil in the traffic areas of sod orchards. Apparent water infiltration rates were significantly higher in non-traffic than in traffic areas in all orchards. Large differences observed, however, indicate that severity of effect is considerably influenced by soil type, previous management and moisture content.—Rutgers Univ., N. Brunswick, N.J.

153. Philipse, W.
Een "zelfdenkende" cirkelmaaier. **(A "thinking" rotary mower.)**
Fruitteelt, 1956, **46**: 790-1, illus.

An extra cutting disc is attached by a hinged mount to the side of a rotary mower. A bicycle wheel with a strong tyre is mounted above this, having a diameter of about 10 cm. greater than that of the rotary disc. When the bicycle wheel comes into contact with a tree trunk the mower is pushed inwards, and is pulled out again afterwards by a strong spring. This allows the sward to be cut close to the trees without damage to the trunks.

154. van Soest, G. J. A.
Grondbewerking tot aan de stam van de boom. **(Soil cultivation right up to the tree trunk.)**
Fruitteelt, 1956, **46**: 721, illus.

A swivel hoe was attached to the side of a cultivator, and a rubber-rimmed wheel mounted horizontally on top. When the wheel was turned by contact with a tree trunk, the hoe was pushed inwards away from the trunk. The illustrations show the apparatus being demonstrated in a young plantation in Germany.

155. Weca.
De verstek-eg van de heer Smits. **(The four-armed harrow of Heer Smits.)**
Fruitteelt, 1956, **46**: 805, illus.

A new tool for cultivating in the tree row is described. A cross-shaped harrow with another, rubber-covered cross above is mounted at the side of the tractor. When the upper arm, which is slightly in front of the harrow, contacts a tree the apparatus is turned so that the next harrow arm comes into operation.

Various cultural operations.

(*See also* 58, 181l.)

156. Preston, A. P.
Orchard tree spacing in relation to wind and cropping.
J. hort. Sci., 1956, **31**: 303-6, bibl. 3.

Two 10-acre plots on an exposed hill top in Kent were planted in 1946 with trees of 4 apple varieties on M.II stocks spaced at 25½ feet square. One plot had, in addition, an interplant of 3 filler trees of the same varieties on M.IX to each permanent tree, giving a tree spacing of 12¾ feet square. Wind records showed that in each of 3 years, 1953-55, the run of wind was greater in the low-density plot, the increase ranging from 21 to 37% during blossoming and from 28 to 44% during the post-blossom period. Up to 1955 both size and yields of the permanent trees in the high-density plot were substantially greater than those of the trees in the low-density plot.—E. Malling Res. Stat.

157. Jacobs, A.
Trois années d'expérience dans l'abattage des arbres fruitiers non rentables. **(Three years' experience in uprooting old fruit trees.)** [English and German summaries 5 lines each.]
Rev. Agric. Brux., 1956, **9**: 823-49, illus.

The author reports on his experiences in the uprooting of standard trees, and describes the method of fastening the cable to the trees, and the apparatus used in uprooting. He also discusses the use of chain saws to cut up trunks and branches.

Harvesting and ripening.

(*See also* 181r.)

158. van de Plasse, J. B.
De invloed van de pluktijd en het doorplukken bij Cox's Orange Pippin over de jaren 1954 en 1955. **(The influence of time and method of picking Cox's Orange Pippin in the years 1954 and 1955.)**
Fruitteelt, 1956, **46**: 849, 851.

In comparison with early picking, late picking resulted in fruit of better quality and in higher yields. Less bitter pit occurred in late-picked fruit. There was little difference between harvesting all the fruit at once or harvesting in several picks.

159. Powrie, W. D., and Asselbergs, E. A.
The influence of post-harvest ripening of McIntosh apples on the yield, composition and flavour of the juice.
Canad. J. agric. Sci., 1956, **36**: 349-55, bibl. 21.

The main object of the study described was to determine the effects of delay between harvesting and processing on the yield and quality of canned apple juice. McIntosh apples were harvested at prime maturity for the fresh market and ripened at about 72° F. for various periods up to 32 days. The maximum juice yield, 69% by weight, was obtained on the 6th day of ripening. During ripening acidity and ascorbic acid contents declined slowly, pH values and reducing sugars increased, and soluble solids and total sugars rose for 18 days and then decreased.—Canada
Agric., Ottawa.

160. Strachan, C. C., and Porritt, S. W.
Quality of canned peaches affected by maturity, ripening and storage.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. 1955*, 1956, p. 9.

Veteran peaches for canning were picked at va
intervals before canning ripeness, and ripened a
70 and 80° F. before and after cold storage. The
quality peaches were obtained by picking 6 to 8
before canning ripeness. The optimum rip
temperature was 70° F., and cold storage at 31–3
after ripening gave the best results.—Exp. Fm,
merland, B.C.

Packing and marketing.

(*See also* 55, 181y.)

161. Hardenburg, R. E.
Polyethylene film box liners for reducing weight losses and shriveling of Golden Delicious apples in storage.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 82-90.

Two seasons' trials with sealed and non-sealed
ethylene box liners showed them to be very eff
for preventing weight loss and shrivelling of G
Delicious apples stored at 31° F. A non-sea
preferable to a sealed box liner because it is e
satisfactory in preventing shrivelling and doc
endanger flavour as may a sealed liner. Polyet
box liners made from 2 overlapping sheets also
factorily prevented shrivelling and loss of w
Fiber board cartons with aluminium foil lamina
the inside were almost as effective as the film
There was no indication that the use of m
proof film box liners increased the rate of de
breakdown other than scald.—U.S. Dep.
Beltsville, Md.

162. Poapst, P. A., and Phillips, W. R.
The use of polyethylene film for apple bo liners.
From abstr. in *Rep. Canad. Cttee Fru Veg. Preserv. 1955*, 1956, pp. 4-5.

Lobo, McIntosh, Cortland and Lawfam apple
stored in apple boxes with polyethylene liners
fruits tended to lose their characteristic flavo
mealiness increased substantially. Later tests
that Lobo stored reasonably well with the
but there was a higher incidence of fungal r
breakdown in McIntosh. Superficial scald and
rots were severe in Cortland, and Lawfam was s
damaged by CO_2 injury.—Centr. exp. Fm, Otta

163. Porritt, S. W.
Storage of Anjou pears in polythene b liners.
From abstr. in *Rep. Canad. Cttee Fruit Ve Preserv. 1955*, 1956, p. 3.

Tests in 1954–55 showed that the storage pe
Anjou pears was extended about 2 months by
at 32° F. in sealed 1·5 mil. polythene box liners.
and flavour were considered good. Atmosphere
liners reached equilibrium within about a
packing and henceforth remained fairly c

ungicidal wash and copper-treated wraps may be dvisable and film thickness should not exceed 1·5 mils. –Exp. Fm, Summerland, B.C.

164. D.S.I.R., New Zealand.
Waxed-paper liners for pear storage.
A.R. D.S.I.R., N.Z., 1955-56, p. 15.

osses from wilt among Winter Cole pears in cool torage have recently been increasing. In a large-scale ommercial trial the amount of wilted fruit was reduced rom 68% to 15% by including a single waxed-paper ner in the case. Reduction in wilting resulted in better quality and heavier pear.

165. Blank, H. G.
Die neue "halbverlorene" Verpackung der Niederelbe. **(The new semi-returnable container of the lower Elbe district.)**
Mitt. ObstVersuchsringes Jork, 1956, **11**: 200-4, illus.

new fruit pack has been used with success in north ermany. The wooden framework which is returnable lined with a cardboard tray in which the fruit is sold. easurements for the 2 sizes of the containers (12·5 nd 20 kg.) are given.

166. Spice, H. R.
Grow the stuff already prepacked.
Grower, 1956, **46**: 1168-70, illus.

small scale trials apple, pear, plum and cucumber uits have been grown in polythene film which expands ith growth.

167. (Ryall, A. L., and others.)
Bartlett pears . . . better and earlier.
Agric. Res. Wash., 1956, **4**(12): 13.

alifornia-grown Bartlett pears can be marketed earlier d in better condition in the eastern U.S.A. by reducing e icing in refrigerator cars to allow the fruit to ripen rtially in transit. Recommendations according to e U.S. tariff rules are given.

Cooling and storage.

(*See also* 56, 181t, 987.)

68. Poapst, P. A., and Phillips, W. R.
The effect of precooling on the storage behaviour of apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. 1955*, 1956, p. 2.

ts of McIntosh, Cortland and Lobo apples were ven 4 rates of precooling before storage at 32° F. McIntosh flavour in rapidly-cooled fruit was better to 4 months' storage, but the difference disappeared ter 6 months' storage. Rapidly-cooled Cortland uit had a better flavour throughout storage period, e difference being more marked at first; the incidence fungal wastage, breakdown and superficial scald s lower in the hydra-cooled fruit. Lobo did not ow any response to different rates of cooling.— ntr. exp. Fm, Ottawa.

69. Guillou, R., and Parks, R. R.
Fruit cooling by forced air.
Calif. Agric., 1956, **10**(9): 7, illus.

portable orchard cooling unit holding 3 tons of it and 9 tons of ice has been designed for apricots, aches and grapes. Cold air is forced through the boxes of fruit, and cooling time has been reduced to ⅛ of that taken in a conventional cold store.

170. (Sainsbury, G. F.)
Fruits move fast when they're precooled.
Agric. Res. Wash., 1956, **5**(2): 12-13.

An apparatus has been developed to blow cold air on to boxes of fruit passing on a conveyor belt to cold storage. Cherries were cooled to 40° F. after 15 minutes' exposure, but precooling of apricots and peaches took longer. It was not found practicable to precool peaches to below 55° F. The system makes it possible to ship cherries and apricots on the day they are picked.

171. Caldwell, J.
Studies in the respiration of apple at various pressures of oxygen.
J. exp. Bot., 1956, **7**: 326-34, bibl. 9, illus.

The results of experiments on the effect of high pressures of oxygen on apples are outlined. It is shown that *partial* pressures of the order of 500% oxygen are toxic to the tissues and that there is no evidence of an initial increase in CO_2 output over that in 1 atmosphere 100% oxygen. It is further shown that the *actual* pressure (up to 20 atmospheres) is not responsible for the disorganization of the cells but that there is specific oxygen toxicity. [Author's summary.]—Dept. Botany, Univ. of Exeter.

172. Treccani, C. P.
Sul "disfacimento da bassa temperatura" riscontrato nelle mele cv. Abbondanza conservate in frigorifero. **(Low-temperature breakdown occurring in the apple variety Abbondanza in cold storage.)**
Frutticoltura, 1956, **18**: 349-56, bibl. 1, illus.

This variety was very susceptible to cold injury when stored at 1° C. Discoloration from light to dark brown spread inwards from a few mm. inside the skin but did not affect the core. Visual symptoms were not present until some days after removal to normal temperature when the skin became dull and brownish. Firmness to touch decreased in advanced stages of breakdown. Vascular bundles, discoloured immediately by typical frost damage, were unaffected until the final phase of breakdown at 1° C.

173. Smock, R. M., and Blanpied, G. D.
Apple scald control.
Fm Res., N.Y. Exp. Stat., reprinted in *Wis. Hort.*, 1956, **47**: 43, 53.

Surveys have shown that high temperatures during the last 4–6 weeks of the growing season are likely to increase the severity of scald on susceptible varieties. Susceptibility to scald is greater in apples picked at an immature stage than in those picked at prime maturity. No consistent relationship has been found between incidence of scald and time between harvest and storage, type of storage, use of oiled wraps or use of box liners. Diphenylamine has shown considerable promise as a scald "inhibitor" [see *H.A.*, 26: 238].—N.Y. Exp. Stat.

174. Bain, J. M.
A histological study of the development of superficial scald in Granny Smith apples.
J. hort. Sci., 1956, **31**: 234-8, bibl. 2, illus.

Tissue changes in the hypodermis, associated with the successive stages of scald development in apples during and after low-temperature storage, are described and illustrated. No histological changes in the tissue were found prior to the appearance of macroscopic symptoms of superficial scald, except for a slight difference in intensity of staining with methylene blue.—Div. Food Pres. Transport, C.S.I.R.O., Homebush, N.S.W.

175. Eaves, C. A.
Influence of fungicides on the storage quality of apples.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Preserv. 1955*, 1956, p. 1.

Preliminary trials with 5 fungicides show that phenyl mercuric chloride and Captan sprays were associated with relatively low incidence of fungal rotting in stored McIntosh apples. There was also a relatively high acid level in fruits sprayed with the mercuric compound. —Exp. Fm, Kentville, N.S.

176. Kessler, H., and Stoll, K.
Versuchsergebnisse bei der Kaltlagerung von Birnensorten. **(Experimental results from cold storage of pear varieties.)** [French summary ½ p.]
Landw. Jb. Schweiz., 1956, **5**: 259-83, bibl. 34.

Results of refrigerated storage (at 0° C.) trials with 24 pear varieties are given. As a result of the trials the following varieties (grouped according to season) are recommended for this method of storage: Williams, Louise Bonne d'Avranches and Gorham; Doyenné du Comice, Beurré Bosc, Virginie Baltet and Fondante de Thirriot; Conférence, Joséphine de Malines, Beurré d'Anjou, Passe Crassane, Beurré d'Hardenpont and Winter Nelis.

Composition.

(*See also* 18, 159, 181a, k.)

177. Džamić, M.
The dynamics of total acids and of pH in fruit. [Serbian, with English summary 2 pp.]
Rev. Res. Work Fac. Agric. Belgrade, 1956, **4**(1): 103-25, bibl. 28.

The changes in total organic acid content and pH values during growth, ripening and storage were studied on some sour, semi-sour and sweet apple varieties and also crab apples. The period when a decrease in the rate of reduction of acid content sets in was found to coincide with the onset of intensive carbohydrate accumulation in the fruit.

178. Jermyn, M. A., and Isherwood, F. A.
Changes in the cell wall of the pear during ripening.
Biochem. J., 1956, **64**: 123-32, bibl. 24.

The ethanol-insoluble cell wall material of Conference pears sampled after picking and after 7, 11, 16, 23 and 31 days storage at 15° C. was analysed chromatographically and colorimetrically to follow the changes in the polysaccharide content. The results indicate that the cell wall of the pear appears to be in dynamic equilibrium with the cytoplasm, and polysaccha are both broken down and synthesized durin physiological processes of ripening. The h lignified stone cells do not appear to alter.— Temp. Stat. for Res. Biochem., Cambridge, D.S.I.R. J.R

179. Hough, L., and Pridham, J. B.
Incorporation of carbon-14 into the complex polysaccharides of plants.
Nature, 1956, **177**: 1039, bibl. 2.

Fruit-bearing spurs of Victoria plums were allow photosynthesize in the presence of $C^{14}O_2$. Six saccharides were subsequently identified in the and 3 water-soluble polysaccharides in the fruit carp. All proved to be radioactive, and the s activity of each is recorded. It is concluded th complex polysaccharides are biosynthesized, no in the leaf, but also, contrary to the classical vi the mature fruit, thus suggesting the existence dynamic equilibrium between these polysacch and their monosaccharide constituents in a m analogous to that of animal proteins.—Dep. Chem., Univ. Bristol.

180. Andrews, P., and Hough, L.
The isolation of 2-*O*-methyl-D-xylose fro from plum leaf hemicellulose.
Chem. Ind. Lond., 1956, No. 43, p. 127 bibl. 10.

In the course of studies on the biosynthesis of cellulose in Victoria plum leaves the identity of saccharide constituents, recognized previous [s preceding abstract], has been confirmed and add minor constituents, including 2-*O*-methyl-D- have been characterized. So far as is known thi first recognition of a methylated aldopentose in and the possible processes leading to its biosy are discussed.—Dep. organ. Chem., Univ. Bris

Noted.

181.

a Abad Manrique, J. B., and
Luna Moreno, C.
Algunos datos sobre el aceite de semil de manzana. **(Some data on the oil apple seeds.)** [English summary 7 lines.]
Farmacognosia, 1951, **11**: 223-30, bibl.
[received 1956].

b Buchta, V.
Rez ovocných drevín z hl'adiska slove kých skušeností a najmä v odvetví marhul'ovníkov, broskyňovníkov a man ovníkov. **(Pruning of fruit trees from viewpoint of Slovak experience, especiall apricot, peach and almond trees.)** [Russi English and German summaries 1 p. ea
Sborn. čsl. Akad. zeměd. Věd, Rostl. Vyr
1956, **29**: 487-95.

c Burkholder, C. L.
Fenton, a promising summer apple.
Fruit Var. hort. Dig., 1956, **11**: 3.

d Cain, J. C., and Mehlenbacher, R. J.
Effects of nitrogen and pruning on trunk growth in peaches.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 138-43, bibl. 10.

e Crossa-Raynaud, P.
Collections pomologiques. **(Pomological collections.)**
Rapp. Serv. bot. agron. Tunis. 1955, 1956, pp. 169-72.

f Dermine, A.
La culture fruitière en Belgique. **(Fruit growing in Belgium.)**
Arboric. fruit., 1956, No. 29-30, pp. 3-11, illus., and No. 31, pp. 5-7, bibl. 4, illus.
Top and small fruit—a review.

g Fourmont, R., and Mayer, R.
Établissement d'un catalogue officiel des variétés de fruits et légumes. **(Founding an official catalogue of fruit and vegetable varieties.)**
Reprinted from *Ann. Nutrit. Aliment.*, 1955, **9**: A221-30.
Both national and international.

h Goode, J. E.
Soil-moisture relationships in fruit plantations.
Ann. appl. Biol., 1956, **44**: 525-30, bibl. 3.
Work at East Malling.

i Greenham, D. W. P.
Orchard soil management.
Ann. appl. Biol., 1956, **44**: 521-5, bibl. 10.
A review.

j Horticulture Division [N.Z.].
Budding and grafting of fruit trees.
Bull. N.Z. Dep. Agric. **81** [undated, received 1956], pp. 19, illus.
Methods and rootstocks.

k Hulme, A. C.
Shikimic acid in apple fruits.
Nature, 1956, **178**: 991-2, bibl. 10.
Found in the peel of Bramley's Seedling.

l Kettner, H.
Ein Beitrag zur Frage der optimalen Bestandsdichte im Obstbau. (Betriebswirtschaftliche Betrachtung). **(A report on the problem of optimal planting distance in fruit growing; economic considerations.)**
Gartenbauwiss., 1955, **2**: 505-16, bibl. 27, illus.
A more detailed and illustrated account of *H.A.*, 26: 3324.

m Krümmel, H.
Zur Sortenklärung bei Süsskirschen. ['Büttners Rote Knorpelkirsche', 'Büttners Späte Rote Knorpelkirsche', 'Querfurter Königskirsche', 'Altenburger Melonenkirsche'.] **(Varietal distinctions in sweet cherries.)**
Dtsch. Gartenb., 1956, **3**: 237-40, illus.

n Lecrenier, A.
Les progrès de l'arboriculture fruitière en Belgique. **(Progress in fruitgrowing in Belgium.)**
Rev. Agric. Brux., 1956, **9**: 809-22.

o Paci, C.
Vignola, regno delle ciliege. **(Vignola, kingdom of cherries.)**
Ital. agric., 1956, **93**: 503-8, illus.
With brief reference to control of *Rhagoletis cerasi* and commercial uses of fruit damaged by it in Emilia, N. Italy.

p Passecker, F.
Unterlagenprobleme im Obstbau. **(The rootstock problem in fruit growing.)** [English, French and Spanish summaries ¼ p. each.]
Mitt. Klosterneuburg, Ser. B, 1956, **6**: 175-89.

q Preston, A. P.
The control of fruit-tree behaviour by the use of rootstocks.
Ann. appl. Biol., 1956, **44**: 511-17, bibl. 23, illus.
A review of work on the use of rootstocks, chiefly the Malling and Malling-Merton clones.

r Ryall, A. L.
How to tell when to pick apples, pears, plums.
Amer. Fruit Gr, 1956, **76**(9): 11, 25, 28, illus.

s Shaffer, J. D., and Quackenbush, G. G.
Consumer purchases of apples.
Spec. Bull. Mich. St. Univ. **405**, 1955, pp. 28, bibl. 2.

t Shutak, V. G., and Christopher, E. P.
Storage scald control by orchard applications of mineral oil.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 80-81, bibl. 1.
Spraying Cortland apples prior to harvest with 5% mineral oil.—Agric. Exp. Stat., Kingston, R.I.

u (Sveriges Yrkesfruktodlares Riksförbund.)
Sortlista för äpplen för den yrkesmässiga fruktodlingen. **(A list of apple varieties for commercial fruit growing [in Sweden].)**
Fruktodlaren, 1956, **27**: 132-4.
15 dessert and 2 culinary varieties recommended, the rest (29) rejected.

v Teterev, F. K.
Cherries in the Leningrad province. [Russian.]
Agrobiologija, 1956, No. 2, pp. 17-27, bibl. 2, illus.
New hardy varieties.

w von Vahl, E.
Befruchtungsmöglichkeiten bei unseren Süsskirschensorten. **(Cross fertilization in North German sweet cherry varieties.)**
Mitt. ObstVersuchsringes Jork, 1956, **11**: 173-5, bibl. 4.

x Williams, A. H.
A new dihydrochalkone from *Malus* species.
Chem. Ind. Lond., 1956, No. 44, p. 1306, bibl. 3.
Largely replacing phloridzin, the dominant phenolic in leaves and bark of most apple species.

y Williams, C. G.
Specifications of fruit and vegetables packages.
Qd agric. J., 1956, **82**: 263-74, illus.
With notes on construction of fruit cases.

z Wulff, B. W. J.
Developments in orchard equipment: a summary of progress in Britain.
World Crops, 1956, **8**: 335-8, illus.
Mechanical pruners, cultivators, mowers, sprayers, packers and graders.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 3, 44, 147, 241a, c, m, q, r, 242b-d, 992, 997.)

182. Lasheen, A. M., and Blackhurst, H. T.
Biochemical changes associated with dormancy and after-ripening of blackberry seed.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 331-40, bibl. 27, illus.

Embryo dormancy in blackberry seeds was broken by after-ripening for 7 months under moist conditions at 3±2° C. During this process there were relatively rapid decreases in starch and increases in sucrose and reducing sugars. Similar, but much slower, changes occurred in seeds after-ripened at room temperature of 25±3° C. When sulphuric acid treatment for 45 min. preceded chilling the initial rate of starch breakdown was accelerated. As after-ripening progressed the activities of peroxidase, lipase and especially catalase increased rapidly. Ether-soluble growth-inhibiting substance(s) were extracted from freshly harvested seeds, being found in highest concentration in the endosperm, lower in the testa and lowest in the embryo. The disappearance of the inhibitor(s) during low-temperature after-ripening was correlated with the breaking of dormancy. Seeds kept dry at room temperature for the same period remained dormant and still contained the inhibiting material. The results suggested that growth-promoting substances may also be involved in dormancy and germination.

183. Darrow, G. M.
Use of naphthalene acetamide in blueberry breeding.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 341-3, bibl. 2.

During the winter of 1954/55 Na amide as a 1% lanolin paste was applied to the torn corollas and stamens of the emasculated flowers of several rabbiteye blueberry varieties growing in a greenhouse as a prelude to cross pollination with pollen from a large number of varieties. The ♀ parents were all hexaploids and most of the ♂ parents diploids. A large percentage of the flowers treated with NA amide developed into berries, but the total number of seeds obtained was no higher than that produced by the few fruits set from an equal number of pollinations of untreated flowers.—U.S.D.A., Beltsville, Md.

184. Schulz, F.
Untersuchungen über den Schnitt an Stachelbeeren. **(Studies on gooseberry pruning.)**
Obstbau, 1956, **75**(6): 87-9, from abstr. in *Beerenobstschrifttum*, 1956, No. 3, p. 11.

Two pruning systems were used on Weisse Triumph and Weisse Volltragende gooseberry bushes. The bushes were either thinned only or thinned and the one-year-old wood cut back to 5 buds. When bushes were thinned only pruning time was less, and total and bush yields were greater than with the spur pruning method. Picking was quicker in spur-pruned than in thinned bushes.

185. Pehoto, L. T.
The effect of fertilizers on the growth and fruiting of raspberries. [Russian.]
Sad i Ogorod, 1956, No. 9, pp. 56-8.

Experiments in the Leningrad region showed that the highest yields were obtained where, in addition to an annual dressing of 30t. per ha. of FYM, young plants received a spring application of 90 kg. per ha. each of N, P and K, and plants more than 6 years old received 90 kg. per ha. of N in the spring, followed by 90 kg. per ha. each of P and K after harvest. It was observed that young plants were more frost resistant than older ones; manuring did not appear to affect this relative resistance.

186. van Adrichem, M. C. J., and Bosher, J. E.
The propagation of root-rot-free strawberry and trailing cane fruit plants.
Plant Dis. Reptr, 1956, **40**: 739-40, bibl. 6, illus.

Methods for obtaining planting stock of strawberries and cane fruit free from root rots are described. Strawberry runners were rooted in punnet baskets containing a 2 : 1 mixture of clean sand and peat. After rooting the runners were removed from the field for growing on in the punnets. Tips of cane fruits were buried vertically in the sand/peat mixture in punnets placed on tar paper.

187. Łucka, M.
Truskawki. **(Strawberries.)**
Państwowe Wydawnictwo Rolnicze i Leśne, Warszawa, 1956, 8 × 6 in., pp. 134, bibl. 45, illus., zł.9.

This booklet gives a comprehensive account of the rawberry. Sections on origin and distribution, conomic importance and morphology are followed by lustrated descriptions of 35 varieties which are then rouped into cultural categories. Other aspects dealt ith are propagation, soil, site, preparation of land, lanting, cultivation, packing, pests and diseases, ost protection, breeding and forcing.

188. REID, R. D.
Over four tons an acre from Talisman.
Grower, 1956, **46**: 972-6, illus.

progress report on the performance of this new riety. Runner production has been very heavy,)–50 runners per plant being usual. In tests at uchincruive over 4 tons per acre marketable fruit was btained. The variety has proved fairly susceptible to otrytis fruit rot. Under conditions which favour gorous growth Talisman should not be grown on the atted row or matted bed system.

189. KRONENBERG, H. G.
Praktijkproeven met aardbeien in 1956.
(**Field trials with strawberries in 1956.**)
Fruitteelt, 1956, **46**: 928-9, illus.

romising strawberry selections have been under trial various places in the Netherlands. Varieties which ere considered worthy of further testing were I.V.T. lections numbers 707 and 797, Senga Sengana, letz (Oregon 2172) and Seedling 1 Frederiksoord.

0. DENISEN, E. L.
Chemical inhibition of strawberry runners in the matted rows.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 312-23, bibl. 13, illus.

prays of maleic hydrazide (MH-40) at 1,000 and 0 p.p.m. and 73% dichloral urea (DCU) at 5,000 d 10,000 p.p.m. were applied to Blakemore strawrries on 3 occasions between July 31 and Sept. 7. ese treatments were compared with runner pruning hand and unpruned matted row controls. MH eatly reduced runner production and numbers of oted runners, and, in common with hand pruning, d a favourable effect on the next crop both as regards ly and total yield and fruit size. [See also *H.A.*, 2533.] DCU also reduced runner formation, but a lesser extent, and in addition caused pronounced nting of the plants. The N% dry matter in the ants was not affected significantly by any of the treatents; the highest percentage N occurred in the leaf ades, followed in decreasing order by the crowns, ots and petioles.—Ia St. Coll., Ames.

91. HITZ, C. W., AND BROWN, M. S.
Control of strawberry runner growth with sprays of maleic hydrazide.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 324-30, bibl. 2, illus.

a continuation of work reported earlier [*H.A.*, : 3643] Blakemore and Tennessee Beauty strawberries ere subjected to 4 treatments: (*a*) Two or three spray plications of maleic hydrazide, 1,000 p.p.m. at gal./20 ft. row, starting on August 1 or September 1; hand pruning of growing points starting on the me dates; (*c*) hand spacing to leave runner plants 9 in. apart in rows 3 ft. apart; and (*d*) no treatment. ompared with the untreated plots MH caused reductions in runner elongation and the number of daughter plants established and in heavier crowns and larger yields. In general, treatments started on Aug. 1 appeared to be more effective than those started on Sept. 1. Spraying was, however, less effective than hand pruning or plant spacing for most of the measurements recorded.—Univ. Del., Newark.

192. MORGAN, A. H.
Strawberry capping machines to benefit grower and processor.
Market Grs' J., 1956, **85**(8): 5, 16, illus.

A new machine has been developed at the University of Tennessee for removing the calyx from strawberry fruits. It is used in the processing plant but benefits growers by allowing them to pick strawberries for processing without capping them in the field and to dispose of the fresh market surplus to processors.

193. LIEBSTER, G.
Untersuchungen über die Festigkeit des Fruchtfleisches und die Verletzbarkeit der Fruchthaut verschiedener Erdbeersorten.
(**Studies on the resistance of the flesh and the vulnerability of the skin in fruits of some strawberry varieties.**) [English, French and Spanish summaries, 7–8 lines each.]
Mitt. Klosterneuberg, Ser. B, 1956, **6**: 239-49, bibl. 12, illus.

Ripening fruit from 19 strawberry varieties were examined in a study of their mechanical resistance. The methods of measuring fruit colour and flesh resistance are described. The specific gravity of the fruits did not show a clear relation to resistance of the fruit flesh. The vulnerability of the skin was estimated by the amount of juice lost when the berries were shaken in an apparatus. In general the amount of juice lost was directly related to flesh resistance.—Inst. Obstbau, Weihenstephan.

194. LIVINGSTON, G. E., AND MARKAKIS, P.
Biosynthesis of pelargonidin-3-glucoside-C^{14}.
Science, 1956, **124**: 28-9, bibl. 4.

In an attempt to obtain some of this strawberry fruit pigment labelled with C^{14}, several methods of introducing C^{14} into plants and fruits were tested. Two methods proved successful, namely, the exposure of plants to $C^{14}O_2$, and the application of crystalline, uniformly-labelled glucose-C^{14} to longitudinal cuts made in fruit stems. In both cases it was possible to extract the pigments present and to isolate the crystalline pelargonidin-3-glucoside-C^{14}.—Univ. Mass., Amherst.

Vines.

(*See also* 2, 10, 241b, d-j, l, n-p, s-z, 242a, e, f, 961, 977, 992, 994.)

195. MORETTINI, A.
Principali aspetti della coltivazione dei fruttiferi adatti alla produzione della frutta secca e da essiccare. (**Principal aspects of the cultivation of fruit species suitable for production of dried fruit.**) [English, French and German summaries, ½ p. each.]
[*Publ.*] *Cons. naz. Ric. Ist. naz. Nutr.*, 1955, pp. 18.

A paper read at a congress on dried fruits at Bari, on 26 Sept. 1954. Production, exports and imports of nuts and fruits are analysed for Italy, with special reference to almonds, walnuts, hazel nuts, chestnuts, figs, carobs, raisins and prunes.

196. Domokos, J.
Növényföldrajzi határok mint a szőlőtermesztés határvonalai. **(Plant-geographical boundaries as boundary lines of viticulture.)** [Russian and German summaries 10 lines each.]
Agrártud. Egy., 1954 (issued 1956), **18** (2, part 2): 113-15.

In Hungary high quality red wines are produced in areas where *Tilia argentea* grows widely, and high quality white wines where *Fraxinus ornus* occurs.

197. Ferenczi, S.
A nyári időjárás szerepe a borok alkoholtartalmának kialakulásánál. **(The effect of summer climate on alcohol content of wines.)** [Russian and English summaries 1 p. each.]
Növénytermelés, 1956, **5**: 61-70, bibl. 9.

Data were collected between 1947 and 1953 on the composition of wine samples and meteorological conditions. A positive correlation was found to exist between a modified temperature coefficient for July to September and the average alcohol content of the wines.—Viticult. Res. Inst., Budapest.

198. Vinničenko, V. I.
The dependence of the vegetative period on the sum of active temperatures. [Russian.]
Vinodelie i Vinogradarstvo, 1956, No. 5, pp. 33-6, bibl. 1.

In Kazakhstan during the seasons of 1942–1954 the growth period, i.e. from the date the temperature exceeded 10° C. to full maturity of the fruit, of the vine variety Pino černyj varied from 116 to 156 days. The sum of active temperatures taking 0° C. as base varied from 2,570 to 2,945° C., a difference of 375° C., whereas taking 10° C. as base the respective figures were 1,410 and 1,385° C., a difference of only 25° C. It appears that for full fruit maturity of a variety a fairly constant sum of temperatures above 10° C. is needed, which sum, however, can be influenced by environmental factors such as irrigation, drought, frost damage and pest and disease incidence.

199. de Bioxo, —.
Influence de la température de l'air [et] de l'insolation sur les dates de débourrement, de la fécondation de la vigne et le degré des vins produits. **(The effect of air temperature and sun exposure on dates of bud burst and fertilization and on the quality of wines produced.)**
C.R. Acad. Agric. Fr., 1956, **42**: 494-500.

Quality of wines from a vineyard in the East Pyrennees was related to hours of sunshine and air temperature, and was improved by increased sunshine and higher air temperature. The wine reached a higher specific gravity after early bud burst than after late bud burst. There was some correlation between duration of sunshine, air temperature and the dates of flower fertilization.

200. Kozma, P.
A szőlőtőke transzpirációjának vizsgálata. **(Studies on vine transpiration.)** [Russian and French summaries ¾ p. each.]
Agrártud. Egy., 1954 (issued 1956), **18** (2, part 1): 169-202, bibl. 4.

The author used an airtight glass and wood box, 0·50 × 0·50 × 1·72 m., enclosing the complete plant for measuring the transpiration of vines in the field. Although conditions inside the box are slightly different from those outside, it is stated that the method is better than existing laboratory methods. It was found that a vine at midsummer on a sandy soil transpired daily 200–1,000 g. of water, depending on the weather.

201. Štefka, F.
Zhodnocení výsledků individuální selekce révy vinné. **(Evaluation of results of individual selection of grapevines.)** [English, Russian and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 653-78.

On the basis of work carried out at Velké Pavlovice in 1948–1953, minimum yields, with due regard to quality, are suggested for plants to be chosen for propagation of 7 commercial vine varieties. It is estimated that by this method the present 32 metric centners per ha. average yield for Czechoslovakia could be increased by 50%.

202. Reichardt, A.
Experimentelle Untersuchungen über den Effekt von Röntgenstrahlen in der vegetativen Vermehrung einer alten Rebensorte. **(Experimental studies on the effect of X-rays in vegetative propagation of an old vine variety.)**
Gartenbauwiss., 1955, **2**: 355-413, bibl. 54, illus.

Results are given of bud irradiation experiments with Sylvaner and the new varieties Mainriesling and Perle von Alzey. Few irradiated shoots survived. Sprouting after irradiation was slower in the 2 new varieties than in Sylvaner. Irradiation often induced necrosis in certain tissue sections. The primary effects and local aberrations induced in leaves and shoots by X-rays are described. Many of these effects occurred less frequently as the dosage was increased. Irradiation of sprouting buds produced more aberrations than that of dormant buds. The frequency with which certain aberrations have occurred in 3 years' of study is discussed and a comparison of these with symptoms of infectious degeneration is made. Growth of 1-, 2- and 3-year-old irradiated vines in comparison with controls was stimulated by low doses and inhibited by high doses. Greater mutational changes were also induced and are described, viz. types of chlorophyll defects, hairiness of the shoot tips, differences in time of ripening and size of stomata. The changes were frequently chimaeral. The results are discussed and the importance of X-rays in a breeding programme is emphasized. An X-ray dose of 2,000–4,000 r is recommended for obtaining mutations in Sylvaner.—Bayer. Landesanst. Wein- Obst- u. Gartenbau, Würzburg.

203. HAČATRJAN, S. S.
Sex inheritance in hybrid seedlings of vine. (Preliminary communication.) [Russian.]
Agrobiologija, 1956, No. 2, pp. 119-22.

hree vine varieties with functionally female flowers vere pollinated with *Vitis amurensis* possessing male lowers and with 6 varieties possessing hermaphrodite lowers. Before crossing, in each combination one of he parents was pruned while the other was not. The ower type of the pruned, hence more vigorous, parent ppeared to predominate in the hybrid progeny. The ffect of pruning on seed setting and germination of the ybrid seeds is also discussed.

204. MIHAJLOVA, P. V.
The variability of flower type in vines. [Russian.]
Bot. Žurnal, 1956, **41**: 542-9, bibl. 7, illus.

ome interspecific hybrids obtained by crossing *Vitis nifera* with *V. amurensis* and *V. rupestris* had staminate ale flowers, without any trace of pistil, during their rst year of flowering. This was followed by a ansient flower type and in their fourth year fruit was roduced. The process is clearly illustrated by line awings.

205. KOZMA, P.
A Kadarka szőlőfajta virágtípusai, a virágtípusok változékonysága és termékenysége. **(Flower types in the vine variety Kadarka, their variability and productivity.)** [Russian and French summaries 4½ and 3½ pp. respectively.]
Agrártud. Egy., 1954 (issued 1956), **18** (2, part 2): 31-111, bibl. 19, illus.
Étude sur la variabilité et la fécondité des types floraux du cépage de Kadarka. **(Variability and productivity of the flower types of the vine variety Kadarka.)** [Russian and German summaries 4 pp. each.]
Acta agron. hung., 1956, **5**: 301-91, bibl. 19, illus.

he important Hungarian vine variety Kadarka male, male, hermaphrodite and irregular flowers occur. ese floral differences have a marked influence on ld. The conditions for fertilization of the different ral types are given and their effect on the structure d composition of the berries is indicated. A close rrelation was found between floral type and leaf pe. Data accumulated over 4 seasons are summarized in several tables and the phenomena observed amply illustrated by photographs and drawings.

06. HERING, M.
Über das Holzmarkverhältnis, ein Kriterium für die Reife des Rebholzes bei der Herstellung von Pfropfreben. **(The wood-pith ratio, a criterion for the maturity of vine wood in the production of grafted vines.)**
Weinwissenschaft, 1956, **10**(3): 1-10, bibl. 6, illus.

fferent methods of measuring and calculating the od-pith ratio in vines were compared, and were nd in practice to give similar estimates of wood turity.

207. ANON.
Ensayo del producto "Rootone Sem" (Supram, S.A.) en su aplicación al enraizamiento de estaquillas dc vides portainjertos. Seccion primera. **(Trial of the product "Rootone Sem" (produced by Supram, S.A.) used for the rooting of vine rootstock cuttings. First section.)**
Bol. Inst. Invest. agron. Madrid, 1956, **16**: 17-27.

Cuttings of the variety Couderc 161-49 with diameter 7–8 mm. and length 70 cm. were trimmed at the base, which was moistened and dipped in the dry product; after the excess had been shaken off the cuttings were planted. There was no significant increase in percentage of rooting of treated cuttings over controls, but in general the vigour of both root and shoot growth was improved by the treatment. Rootone products contain the amide of naphthyl ethyloic acid.

208. MITOVIĆ, D.
Uticaj temperature u stratifikali na sraščivanje i ožiljavanje loznih kalemova. **(The effect of temperature during stratification of vine grafts on union and rooting.)** [French summary ½ p.]
Bilj. Proizv., 1956, **9**: 75-80, bibl. 4.

A high degree of success was achieved in grafting and rooting by maintaining the temperature at 25°–30° C. during stratification and at 22°–26° C. and 18°–20° C. before and during union, respectively.

209. TRUEBA, J., AND HIDALGO, L.
Los portainjertos. **(Rootstocks.)**
Bol. Inst. Invest. agron. Madrid, 1956, **16**: 115-38, maps.

The importance of rootstock selection is discussed with reference to re-stocking Spanish vineyards impoverished by phylloxera. Maps show the density of distribution of vineyards, annual rainfall, humidity index, soil fertility and lime content. Suitable varieties are listed for commercial and experimental use, for planting in soils with various grades of humidity and lime content and for saline areas. Stock-scion relationships are discussed.

210. PIROVANO, A.
La lunghezza di tronco del soggetto e la sua possibile influenza sulle caratteristiche dell'innesto. **(Stem length of the rootstock and its possible influence on the characteristics of the scion.)** [English summary 5 lines.]
Ann. Sper. agrar., 1956, **10**: 1487-94, bibl. 6, illus.

Two examples are quoted of transmission of certain features of bunch structure, fruit shape and ripening from unusually tall rootstocks to scions. In one instance a definite graft hybrid was produced.

211. SNYDER, E., AND HARMON, F. N.
Comparative value of four grape rootstocks for twenty vinifera grape varieties.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 304-7, bibl. 3.

In a rootstock trial in the Napa Valley, California, started in 1938, there is a trend, both as regards growth and yield, in favour of the rootstock Rupestris St.

George. The stocks Mourvedre × Rupestris No. 1202 and Dog Ridge have given results similar to each other but inferior to Rupestris St. George, while Solonis × Othello No. 1613 has given considerably poorer results.—U.S.D.A., Fresno, Calif.

212. Harmon, F. N., and Snyder, E.
Comparative value of four rootstocks for Sultanina grape in rootknot nematode-infested soil.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 308-11, bibl. 2.

A 9-year study was made of the behavior of Sultanina (*Vitis vinifera*) growing on its own roots and roots of Dog Ridge, Solonis × Othello No. 1613, and Rupestris St. George in a rootknot nematode [*Meloidogyne* spp.] infested sandy loam near Shafter, California. Fruit and pruning wood weight records indicate that Dog Ridge and 1613 were the two better rootstocks for this location. They were not significantly different in fruit production but Dig Ridge was significantly the more vigorous. [From authors' summary.]—U.S.D.A., Fresno, Calif.

213. Breider, H., and Wolf, E.
Frostgeschehen 1956 und Rebenzüchtung. **(Frost [incidence in] 1956 and vine breeding.)**
[English, French and Spanish summaries ⅓ p. each.]
Mitt. Klosterneuburg, Ser. A, 1956, **6**: 205-22, bibl. 6, illus.

Since 1950 rootstock selection for frost-resistance has been carried out at Würzburg, and the new material compared with standard rootstocks. Several promising selections have been obtained which combine resistance to frost and phylloxera. The most frost-resistant European vine variety was Riesling, and the new selections Perle von Alzey, S 1-28 and Mainriesling were also highly frost-resistant. Several Riesling crosses also produced frost-resistant progeny. In other varieties clonal differences in frost resistance were apparent.

214. Bovay, E., and Gallay, R.
Étude comparative par la méthode du diagnostic foliaire de l'alimentation de divers porte-greffes de Chasselas sur deux sols différents. **(Comparative study by leaf analysis of the nutrition of several rootstocks of Chasselas on 2 different soils.)**
Rev. romande Agric. Vitic., 1956, **12**: 85-8.

Leaf analysis results have shown that there was little annual variation in nutrient uptake by each vine. Wide variations in nutrition of the same scion variety were possible with different rootstocks, soils, cultural conditions and climate.

215. Kolářík, J.
Výživa vinné révy. **(Nutrition of grape vines.)**
[English, Russian and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 293-302.

It is stated that at ripening the mineral content of the vine stabilizes at 1,000 to 1,400 mg. N per 100 g. dry matter in the aerial parts, with 25 mg. of P and 100 mg. of K per 100 mg. of N. Further storage of nutrients takes place after harvest and the mineral composition of the plant during dormancy, together with such factors as soil type, variety and system of training, serves as an indicator to the amount of fertilizer required for the coming season.

216. Hampl, J.
Koreferát k problému výživy révy vinné. **(A report on the problem of vine nutrition.)**
[English, Russian and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 318-23.

A discussion on the need for investigating the release of plant nutrients by the soil and the use of Vageler's equation in estimating this in connection with vine manuring.

217. Larsen, R. P., and others.
Nutritional conditions of Concord vineyards in Michigan: I. Nutrient-element content of petioles in relation to production. II. Soil analysis in relation to production. III. Petiole analysis and production in relation to applications of potassium fertilizers.
Quart. Bull. Mich. agric. Exp. Stat., 1956, **39**: 63-70, bibl. 4, 71-7, bibl. 8, 78-87, bibl. 13, illus.

I. Petiole analysis for K, P, Ca, Mg, Mn, Fe, Cu, B and N on petioles from 21 vineyards showed that K was the only nutrient element that increased as yield increased. P, Ca, Mg, Mn, Fe and B in the petioles decreased with increasing yield, but this may have been associated with K shortage. K had a significant negative relationship with P, Ca, Mg, Fe and B. II. Soil samples were analysed for exchangeable Ca, Mg and K and for cation exchange capacity. Cation exchange capacity and exchangeable K were both related to yield. The ratio of exchangeable K to the sum of exchangeable Ca and Mg appeared to be more important in relation to yield than the percentage of saturation of the exchange capacity by the 3 cations. III. The influence of K applications on both yield and petiole composition appeared to be related to the amount of available K at the beginning of the experiment. K applications of 180 lb. per acre (but not 90 lb. per acre) to vineyards showing severe deficiency symptoms resulted in an increase in petiole K and yield. Where there were moderate deficiency symptoms there was a marked response to each additional application of K. When no deficiency symptoms were present there was no response to K applications. K sulphate gave a greater increase in yield than K chloride, but this was not statistically significant. After K applications increases in petiole K were accompanied by significantly decreased amounts of other nutrients which could, it is considered, result in an induced deficiency. J.R.L.

218. Roche, R.
Une méthode de fumure de la vigne. **(A method of manuring the vine.)**
Progr. agric. vitic., 1956, **146**: 297-302, illus.

Two methods of inter-row fertilizer distribution a root level are described. In the more successfu method the distributing apparatus was attached to the sub-soiler and the flow of fertilizer was related to the speed of the tractor. The fertilizer travelled down o the base of the ploughshare behind the sub-soiler rame.

219. **Garoglio, P. G.**
Disponibilità di potassio del suolo e natura dei vini. **(Availability of soil potassium and the nature of wines.)** [German, French, English and Spanish summaries ⅔ p. each.]
Paps annu. Mtg Bd tech. Advis. int. Potash Inst., being *Potassium Symposium 1955*, pp. 397-431, bibl. 18.

he part played by K in the nutrition and physiology the vine is briefly discussed. Figures are given for ptake per ha. of N, P_2O_5, K_2O, CaO and MgO as nown by analysis of shoots, leaves, grape marc, ine dregs and wine. French work on foliar diagnosis vines is briefly discussed.

220. **Dobroljubskij, O. K., and Slavvo, A. V.**
Foliar nutrition of vine with the micro-element cobalt. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **106**: 735-8, bibl. 7.

ata are given showing the effect of $CoSO_4$ sprays plied at various concentrations to the vine varieties ligote and Riesling before and after flowering. All eatments increased the weight and volume of the rries and in most cases increased their sugar content compared with the controls. With the variety ligote the best results were obtained from 0·1 g. oSO_4 per plant (300 g. salt per ha.). The variety iesling was sprayed with 5 × 10^{-5} g. $CoSO_4$ per plant ·15 g. salt per ha.) alone and in combination with rdeaux. Both treatments, especially the combined e, greatly increased yield and sugar content and stened maturity. [See also *H.A.*, 25: 3660.]

221. **Cejtlin, M. G.**
Increasing the fruitfulness of laterals. [Russian.]
Vinodelie i Vinogradarstvo, 1956, No. 5, pp. 30-2.

e effect of foliar nutrition and pinching back of nual shoots on the development and fruiting of erals in trellised vines was studied in Uzbekistan. P, K, Mn and B sprays were used, of which P plied before the development of the laterals and B fore ripening gave the largest increases in yield and gar content respectively. To obtain productive terals the shoots should be pinched back above the 7th node.

22. **Blaha, J., and Křivánek, V.**
Podmínky zvýšení plodonosnosti a sklizňovych výnosů u révy vinné. **(Conditions for increasing fertility and yield of grapes.)** [Russian, English, French and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 607-16, bibl. 3.

dies on vines were made to determine the fertility each bud on new growth, the basic conditions for wer differentiation and the variations in bud number fore harvest. The following conclusions were drawn: pruning it is preferable to cut back a number of ots to a few buds rather than leave fewer shoots aring more buds each; the length of the shoots after uning must be related to the vigour of the new growth; adequate nutrition is necessary for normal vine development after pruning.

223. **Antcliff, A. J., Webster, W. J., and May, P.**
Studies of the sultana vine. IV. A pruning experiment with number of buds per vine varied, number of buds per cane constant.
Aust. J. agric. Res., 1956, **7**: 401-13, bibl. 6.

With increasing number of canes per vine, percentage bud burst generally showed a linear decrease, and percentage fruitful shoots, although generally not affected, showed a similar effect after years of high fruitfulness. Bunch number and weight of fresh fruit harvested increased linearly with increasing cane number. Sugar content decreased and number of mature buds produced increased with increasing cane number. Weight of fresh fruit was positively correlated with bunch number, and negatively correlated with sugar content and number of mature buds. Bunch number was positively correlated with percentage bud burst. The yield from 10 canes in a year of low fruitfulness was no greater than the yield from 4 canes in a year of high fruitfulness. In the high year evidence suggesting overloading on vines with more than 7 canes was obtained from the sugar content and bud number results. Vines returned to uniform pruning treatment after a year of high fruitfulness, the third year of the experiment, showed residual effects in the first season but not thereafter. It is concluded that by regulating the number of canes according to the potential fruitfulness found by microscopical examination before pruning, overloading can be avoided in very fruitful seasons and the crop can be improved in years of low fruitfulness. However, complete uniformity of crop from year to year cannot be achieved. [From authors' summary.—For parts I, II and III see *H.A.*, 26: 294, 295, 1497.]—Commonw. Res. Stat., Merbein, Vic.

224. **Trabalzini, N.**
Prove comparative sulla potatura verde della vite. **(Comparative tests on summer pruning of vines.)**
Riv. Vitic. Enol., 1955, **8**: 301-10, illus.

Trials were conducted over 4 years to compare yields after heavy and moderate summer pruning with those from unpruned vines. In 8 tests the best results followed moderate pruning, in 3 no pruning and in the remaining 2, both involving the variety Malvasia, heavy pruning. With one exception the percentage of sugar in the must was highest where no summer pruning had been practised and average sugar production per vine was highest in 7 tests with moderate, in 1 with heavy and in 5 with no pruning. Recommendations based on the tests include: avoidance of heavy summer pruning; planting with wider spacing than that customarily used at Siena; training on 3 wires instead of 2.

225. **Liger, P.**
Réflexions sur l'art de tailler la vigne. **(Thoughts on vine pruning.)**
Fruits et Prim., 1956, **26**: 80-4, bibl. 1.

Shoot growth and grape yields were related to varying degrees of pruning on 12-year-old vines grown as double cordons. Collection of data continued for 4 years. Maximum production and optimum vigour were obtained by pruning to leave 6 bearing shoots each with 2 fruiting buds.

226. Manzo, P.
Potatura delle uve da tavola ultraproduttive.
(Pruning of highly productive dessert grapes.)
Riv. Vitic. Enol., 1955, **8**: 49-52, illus.

In very prolific hybrids and derivatives of the Terra Promessa type, including many Pirovano strains, inflorescences should be reduced 12–15 days before flowering to one per shoot and this should be thinned. Insufficient thinning exhausts the vine. Side shoots should not be removed, but left without inflorescences. A number of leaves, 4–7 according to the system of training, should be left beyond each bunch. Defoliation should not be practised in any variety until a few days before harvesting.

227. C.S.I.R.O., Australia.
Irrigation.
A.R. C.S.I.R.O., 1955, 1955, pp. 39-41.

Vines: differential pruning treatments applied after a hailstorm showed that laterals arising from shoots spurred to 6–10 buds yielded 55% fruitful buds compared with 34% from other treatments; sultana yields appear to be correlated to hours of sunshine; in a weedkiller trial pentachlorphenol in creosote increased yield by about 15%. *Citrus:* the best fruit in a manurial and cultivation trial was produced from a summer clean cultivated treatment, with or without farmyard manure.

228. Kišon, A.
Výsledky a poznatky z vykonávania pokusného rezu a vedenia vo vinohradníckom výskume. **(Results of experiments on pruning and training of vines.)** [English, Russian and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 330-46, illus.

Twelve months of pruning were compared on 7 varieties of vine at the Research Institute for Viticulture and Winemaking, Bratislava. Light pruning with consequent large leaf area produced the highest yields without or only slightly affecting quality. It was found that fruit developing from the upper buds had a lower acid content than that from the lower buds. Some methods of high training and their effect on yield and quality are described. General recommendations on pruning and training are made for areas with conditions similar to those of the Institute, and results obtained at 6 other centres are noted.

229. Odescalchi, M.
A nagyüzemi csemegeszőlőtermesztés zöldmunkái. **(Summer operations in large scale table grape production.)**
Agrártudomány, 1955, No. 6, pp. 260-4, from abstr. in *Hung. agric. Rev.*, **5**(1): 6.

Tests were carried out in 1954 on the effect of selection of shoots, pinching back of fruiting shoots and ringing on 6 table grape varieties grown on the same rootstock. Selection or cutting out of undesirable shoots reduced downy mildew incidence. Pinching back of fruiting shoots before flowering to 4–5 leaves above the upper inflorescence improved fruit quality, weight of bunches and total yield. Ringing increased the size of berries. The combined treatment resulted in 24 to 80% yield increase in the more vigorous varieties. The average weight of bunches was 27 to 61% higher and that of berries 17 to 28% higher than in the controls, and maturity and sugar content were also greatly improved.

230. Valenta, F., and others.
Diskusní příspěvek k (řezu a) vedení révy vinné. **(A contribution to a discussion on vine (pruning and) training.)** [English, Russian and German summaries.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 379-82, 383-5, 386-90 and 391-4, illus.

The first 3 articles in this series report on training vines on a high trellis by the Moser system [see *H.A.*, 22: 231 and 2257] which resulted in as good or better yields and quality than were produced by staked vines. Plants trained high showed greater resistance to spring and autumn frosts and suffered less from downy mildew and fruit rot than those trained low. In the fourth article the value of the Rhine-Hessen, i.e. 60–70 cm. stem, method of training is discussed for 5 varieties, 2 of which (White Burgundy and Red Traminer) were found very suitable for this medium-high method of training.

231. Rjabčun, O. P.
Viticulture on mountain slopes. [Russian.]
Vinodelie i Vinogradarstvo, 1956, No. 4, pp. 25-8, bibl. 9.

A discussion on vine growing on slopes steeper than 8–10°, based mainly on the work of L. Moser in Austria [see *H.A.*, 22: 231 and 2257]. The method recommended for adoption in the U.S.S.R. consists essentially in training the vines as horizontal cordons on a 0·80–1·20 m. high trellis and establishing a permanent sward which is mowed 3–4 times per season with the swath left *in situ*.

232. Dragaš, M., and Avramov, L.
A contribution to the study of growing vines on high stems. I. [Serbian, with English summary ½ p.]
Rev. Res. Work Fac. Agric. Belgrade, 1956, **4**(1): 3-14, bibl. 5, illus.

In 1950 experiments were started in Serbia on growing 4 varieties of vine with stems 0·8, 1·2 and 1·5 m. high trained on trellises and planted 1·5 m. apart in rows 3 m. apart. The results obtained in 1954 and 195 showed that the varieties Prokupac and Game produced similar yields per ha. whether grown with long stem on trellises or short stems (10 cm.) staked. The long stems appeared to increase the sugar content o Prokupac and reduce the acid content of both. It i considered that vines can be successfully grown in Serbia by this method without covering the stem in th winter provided the base of the stem, from which th plant could regenerate in case of frost damage, i earthed up.

233. Konlechner, H.
Ergebnisse von Untersuchungen der Winterfrostschäden und des Verhaltens einiger Erziehungsarten im Jahre 1956. **(Results of studies on winter injury and behaviour of some trained varieties in 1956.)** [English, French and Spanish summaries ⅓ p. each.]
Mitt. Klosterneuburg, Ser. A, 1956, **6**: 223-43, bibl. 7, illus.

t Klosterneuburg winter injury to vines in 1956 ostly affected the aerial parts of the plants, especially nprotected buds. High-trained vines were less verely damaged than medium-trained vines.

34. **Peyer, E.**
Verankerung von Drahtanlagen im Boden. **(Anchoring wiring systems in the soil.)**
Schweiz. Z. Obst-u. Weinb., 1956, **65**: 528-9, illus.

a wire support system for vines strong anchorage as given to the end support stake by fastening the re to a short steel screw inserted about 1 m. into the il.

35. **Manzo, P., and Cosmo, I.**
Primi esperimenti di diradamento biochimico nelle uve da tavola a grappolo compatto. **(Preliminary experiments in biochemical thinning of dessert grapes with compact bunches.)**
Riv. Vitic. Enol., 1955, **8**: 183-6, bibl. 1, illus.

e varieties Sovrana and Perlona were satisfactorily nned by spraying the inflorescences with 2% raduva, a growth-regulating product. A copperated form of this product damaged the grapes of the riety Maria Pirovano. In all cases some injury s caused by sunlight after treatment. In sunny ather a reduction of the concentration to 1·5% is gested. In some instances the thinning was not form.

Nuts.

(*See also* 66w, 73, 195, 241k, 816.)

36. **Urquijo Landaluze, P., and Santaolalla Azpilicueta, G.**
Servivio de producción de castaños resistentes. **(Service for the production of resistant chestnut varieties.)**
An. Inst. nac. Invest. agron. Madrid, 1955, **4**: 733-77, illus.

gress made during 1954 in selecting and propagating stnut varieties resistant to "ink" disease (*Phytohora cinnamomi*) is reported. Spanish chestnuts e crossed with the resistant *Castanea mollissima*, scions from resistant progeny were grafted on to ive rootstocks. Topping of hybrids provided ons, which were stored in open-ended glazed paper appings at 6°–7° C. until the rootstocks were in the ht condition. Wet clay was more satisfactory than stic for sealing the cut ends of stored scions. The t results were from crown grafts on mature vigorous tstocks. Propagation was 35% successful from t grafting. In air-layering trials numerous rootucing substances were tested in different dilutions, h different coverings and moisture conditions and ots of different ages. The best results were from a 3 dilution of a mixture of 1·5% α-naphthylacetic d, 0·5% 3,4-D, 2% oleic acid and lanoline. Soil ering was more effective than plastic bags and root- was improved by covering the treated section with ss before placing in soil. The youngest shoots ted most readily.

237. **de la Rocha G., G.**
Propagación vegetativa del pecano. **(Vegetative propagation of pecans.)**
Inf. Estac. exp. agríc. La Molina, 1956, **30**(344): 9-13, illus.

The most successful method was simple approach grafting which gave excellent results in the field. (In pot experiments the results were invalidated by faulty rubber.) Successful pot grafts were ready for transplanting in 2 months, whereas plants from the nursery had to be completely ripened before moving. September, October and November were the best months for grafting under local conditions (Lima).

238. **Sharpe, R. H., and Gammon, N., Jr.**
Fertilization of pecans.
A.R. Fla agríc. Exp. Stats, 1955, p. 112.

Nitrogen-deficient pecan trees responded better to December and January applications of N than to March applications. A single spring application of 8 or 16 lb. N per tree significantly increased the N percentage in leaves in both June and September samples. Similar quantities of K_2O had less effect on the percentage of leaf K.

239. **Hunter, J. H., and Hammar, H. E.**
Relation of oil contents of pecan kernels to chemical components of leaves as a measure of nutrient status.
Soil Sci., 1956, **82**: 261-9, bibl. 23.

Data are presented and analysed from a series of experiments on the pecan varieties Moore, Schley and Stuart. In the prolific variety Moore low values for nut oil were consistently accompanied by low foliar K and particularly by low K/N ratios. In some instances low oil values were associated with low ratios of P/N or K/(Ca+Mg). Mineral deficiencies due to prolific bearing should be controllable by regulation of N fertilizing which increases the number of nuts produced.

240. **Gerritsen, C. J.**
Research offered new possibilities for nut growing in the Netherlands. [Dutch summary $\frac{1}{3}$ p.]
Euphytica, 1956, **5**: 139-45, illus.

An account is given of recent work on the propagation of walnuts and on the search for better varieties which has resulted in an expansion of walnut growing in Holland.

241.

a **Anon.**
Sonjana, Hummels immertragende Spaliererdbeere. **(Sonjana, Hummel's everbearing climbing strawberry.)**
Dtsch. Baumsch., 1956, **8**: 175-6.
The selection of the climbing strawberry, Sonjana [or Truffaut-Prodige], described by its breeder.

b **Barrett, H. C.**
The French hybrid grapes.
Nat. hort. Mag., 1956, **35**: 132-44, illus.
Descriptions of 18 direct producers that are showing promise in Illinois.

c Benberg, O.
Avranking av jordbaerplanter. **(The removal of strawberry runners.)**
Norsk Hagetid., 1956, **72**: 138, illus.
A home-made tool for cutting off strawberry runners without stooping.

d Bruni, B.
"Pascale di Cagliari." **(The vine variety Pascale di Cagliari.)** [English summary 7 lines.]
Ann. Sper. agrar., 1956, **10**, No. 4, Suppl. pp. cxxix-cxxxv, bibl. 4, illus.
A dual-purpose variety common in Sardinia.

e Cosmo, I.
Gli ibridi produttori da noi ed in Francia. **(Direct producers in Italy and France.)**
Riv. Vitic. Enol., 1955, **8**: 423-5, bibl. 3.
French and Italian policy with regard to breeding and classification.

f Cosmo, I., and Polsinelli, M.
Note ampelografiche. Riesling italico. **(Ampelographical notes. The Italian Riesling vine variety.)**
Riv. Vitic. Enol., 1955, **8**. 215-20, bibl. 13, illus.
Riesling Italico. **(Italian Riesling vine.)**
Ann. Sper. agrar., 1955, Vol. **9**, No. 1, Suppl. pp. xxxiii-xliii, bibl. 14, illus.
A wine variety known as Wälschriesling in Austria and Germany.

g Cosmo, I., and Polsinelli, M.
"Molinara." **(The Molinara vine.)** [English summary 6 lines.]
Ann. Sper. agrar., 1956, **10**, No. 4, Suppl. pp. cxv-cxxvii, bibl. 15, illus.
A red wine variety from Verona.

h Cosmo, I.
Aspetti e problemi della viticoltura e dell' enologia del Cile. **(Aspects and problems of viticulture and enology in Chile.)**
Agric. Venezie, 1956, **10**: 451-77, bibl. 2, illus., and *Riv. Vitic. Enol.*, 1956, **9**, 339-53.

i Cosmo, I., Comuzzi, A., and Reghini, U.
Indagini sulla ricostituzione viticola compiuta sino al 1940 nella zona dell'attuale territorio di Trieste. **(Studies of reconstitution of vineyards up to 1940 in the present territory of Trieste.)** [English summary 5 lines.]
Ann. Sper. agrar., 1956, **10**: 1305-43, bibl. 5, illus.

j Cosmo, I., Comuzzi, A., and Rubin, V.
Indagini sulla ricostituzione viticola delle Venezie ai fini dell'orientamento per i futuri impianti. . . . Provincia di Padova. Quarto contributo. Sottozona dei terreni poco o niente clorosanti. **(Studies on vineyard reconstruction in Venetia with a view to future plantings. Province of Padua, 4th contribution. Zone of the Euganei Hills, soils producing little or no chlorosis.)** [English summary 9 lines.]
Ann. Sper. agrar., 1956, **10**: 1263-79, bibl. 3.

k Crossa-Raynaud, P.
Étude sur la multiplication végétative du pistachier. **(Study on vegetative propagation of the pistachio.)**
Rapp. Serv. bot. agron. Tunis. 1955, 1956, p. 181.
About 30% of the 180 grafts were successful.

l Dalmasso, G.
La situazione della viticoltura mondiale esaminata e discussa nell'America Latina. **(The world situation in viticulture examined and discussed in Latin America.)**
Frutticoltura, 1956, **18**: 317-25, illus.
World production is briefly reviewed for 1954 and 1955, with special reference to Chile and Argentina.

m Darrow, G. M.
The big six blueberry varieties for northern States.
Nat. hort. Mag., 1956, **35**: 162-5, illus.
Notes on Earliblue, Blueray, Bluecrop, Berkeley, Herbert and Coville.

n Dobrovoda, K.
Experimentálna práca s metódami rezu a spôsobami vedenia prevádzaná v malokarpatskej oblasti. **(Experiments on pruning and training of vines in the region of the Little Carpathians.)** [English, Russian and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 353-68, bibl. 16, illus.

o Dohnal, T.
Koreferát k řezu révy vinné. **(A report on the pruning of vines.)** [English, Russian and German summaries 1 p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 369-78.
According to variety and conditions.

p Goosen, R. J.
Irrigation of sultanas along the Lower Orange River.
Fmg S. Afr., 1956, **32**(6): 45-8, illus.
Guidance for growers, with special reference to critical periods.

q Hall, J. W.
Scottish fruit trials. Second progress report: Part II. (Strawberries and blackcurrants.)
Scot. Agric., 1956, **36**: 94-8, illus.
Records of cropping and preserving qualities in 1954 and 1955.

r Klingbeil, G. C., and Wade, E. K.
Wisconsin red raspberries.
Circ. Univ. Wis. Ext. Serv. **515**, 1956, pp. 9, illus.

s Kraus, V.
Methoda ke stanovení nejvhodnějšího typu řezu révy vinné. **(A method of determining the most suitable type of pruning for vines.)** [English, Russian and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 347-52.
With regard to variety, climate and soil.

t LACOMBE, R.
Caractéristiques spéciales du tracteur vigneron. **(The special characteristics of a vineyard tractor.)**
Progr. agric. vitic., 1956, **73**: 143-7.

u MAINGONNAT, A.
Création d'hybrides nouveaux. **(Creation of new hybrids.)**
Rapp. Serv. bot. agron. Tunis. 1955, 1956, pp. 287-90.
Notes on vigour and yield of numerous recent vine hybrids in Tunisia.

v MAINGONNAT, A.
Essais comparatifs régionaux. **(Comparative regional trials.)**
Rapp. Serv. bot. agron. Tunis. 1955, 1956, pp. 294-5.
On vine varieties and hybrids in Tunisia.

w MANZONI, L.
Alcune caratteristiche della Vitis Romaneti. **(Some characteristics of *Vitis romaneti*.)**
Riv. Vitic. Enol., 1955, **8**: 111-17, illus.
The vegetative features and anatomy of this Asiatic species are described.

x MANZONI, L.
Germinazione del vinacciolo e primo of sviluppo della vite da seme. **(Germination seeds and early development of vine seedlings.)**
Riv. Vitic. Enol., 1956, **9**: 267-78, illus.
The technique of raising seedlings is briefly described, the article being mainly concerned with morphology.

y MRVA, J.
Poznatky z pokusov zisťovania potreby živín u vínnej révy. **(Experiments to determine the nutrient requirements of vines.)** [English, Russian and German summaries ⅓ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 303-17.
With due regard to varietal and soil factors.

z PEYER, E., AND HUBER, H.
Drahtanlagen im Rebbau. **(Wiring systems for vines.)**
Schweiz. Z. Obst- u. Weinb., 1956, **65**: 429-38, 448-51, bibl. 1, illus.
To help in reducing labour costs.

242.
a PIROVANO, A.
Il Moscato dell'Adda. **(Adda Muscat grapes.)**
Riv. Vitic. Enol., 1955, **8**: 147-8, illus.
The characteristics of a black dessert variety for export.

b SCHWARTZE, C. D.
Northwest strawberry.
Fruit Var. hort. Dig., 1956, **11**: 4, illus.
A good freezing variety.

c SCHWARTZE, C. D., AND MYHRE, A. S.
Sumner, a new red raspberry variety. Puget Beauty, a new strawberry variety.
Stats Circ. Wash. agric. Exp. Stats **285**, 1956, pp. 3, and **286**, 1956, pp. 4, respectively.

d SONDHEIMER, E., AND KARASH, C. B.
The major anthocyanin pigments of the wild strawberry (*Fragaria vesca*).
Nature, 1956, **178**: 648-9, bibl. 7.

e THERON, C. J.
The trellising of vines in full bearing.
Fmg S. Afr., 1956, **32**: 57-9, illus.

f WILLIAMS, C. F., AND UNDERWOOD, V. H.
Progress in muscadine grape breeding.
Res. and Fmg N.C., 1956, **15**(Progr. Rep. No. 1): 14, illus.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 346d, n, t, u, 347a, e, 357-359, 953, 955, 994.)

243. LIEBSTER, G.
Notwendigkeit und Möglichkeiten der Rationalisierung im obstbaulichen Pflanzenschutz. **(The necessity for and possibility of rationalizing plant protective measures for fruit trees.)**
[*Publ.*] *Inst. Obstb. tech. Hochsch. München* [undated, received 1956], pp. 81-94, bibl. 38.

he author discusses the need for more extensive ological and microclimatic data, so that sprays for est and disease control may be applied at a time nsuring optimum efficiency.

244. GARMAN, P.
Further study of spray combinations for control of apple pests in Connecticut.
J. econ. Ent., 1956, **49**: 521-3.

uring the 4 seasons 1952–1955 7–8 separate insecticide-fungicide combinations were applied and the effects of these treatments on some common apple pests and diseases, fruit quality and appearance were noted. A methoxychlor-TDE-captan-malathion combination produced the cleanest fruit in 1954 and methoxychlor-captan in 1955, when, however, the absence of an acaricide resulted in severe mite damage. [For 1952–1953 results see *H.A.*, 25: 1493.]

Disturbances of nutrition or of unknown origin.

(*See also* 142, 143, 346v, 347d, 755.)

245. TERTS, I.
Az őszibarack-levél sárgulás (klorózis) talajtani okáról. **(The soil factor in peach leaf chlorosis.)** [English and Russian summaries ⅓ p. each.]
Agrártud. Egy., 1954 (issued 1956), **18** (2, part 1): 57-63, bibl. 8.

Results of soil analyses indicate that chlorosis of peach leaves is in most cases caused by a high active lime content of the soil. It was found that the threshold value above which peaches become chlorotic is 8–10% active $CaCO_3$ (less than 0·02 mm. particle size) in the upper 30–40 cm. soil layer. A high humus level raises this value. Different peach varieties appeared to vary in their tolerance of the active lime. A table is given showing the total and active lime contents of some peach soils, and methods of determining the latter are compared.

246. SÁROSI, D.
Klorózisos szőlőtőkékevél- és gyökér-analízise. **(Leaf and root analysis of chlorotic vines.)** [Russian and French summaries 1 p. each.]
Agrokém. Buda., 1956, **5**: 221-32, bibl. 9.

Results of analysis on 3 vine varieties showed that chlorotic plants differed from healthy ones in dry matter content, ash content and cation composition of the ash. Chlorotic leaves had a lower dry matter content than healthy leaves, but the ash content of the dry matter was higher in the chlorotic leaves. Chlorotic leaves were smaller and thinner, contained considerably more Fe, more K and Na but less Ca than healthy ones. Mg deficiency was noted in chlorotic leaves of 2 varieties. Mn deficiency was found in chlorotic leaves of one variety and Mn excess in another, while in the third variety chlorotic and healthy leaves contained similar amounts of this element. The chlorotic leaves showed an increase of monovalent cations at the expense of divalent cations and had a considerably higher Fe content than the healthy leaves. It is therefore probable that chlorosis is due to a disruption of cationic equilibrium and a consequent change in colloidal stability. For control treatment of the vines or the soil with calcium acetate showed promise.

247. ABADÍA, A.
La formación de clorofila en casos de deficiencia inducida de hierro. **(Chlorophyll synthesis in plants suffering from induced iron deficiency.)** [English summary $\frac{1}{3}$ p.]
An. Estac. exp. Aula Dei, 1956, **4**: 212-61, bibl. 75.

Ferrous sulphate was injected into Fe-deficient peach, pear and quince trees, and the effects were studied on chlorophyll synthesis and nutrient balance in the leaves. Treatment markedly increased chlorophyll synthesis. A close correlation was found between the synthesis of catalase and that of chlorophyll. Treatment with ferrous sulphate produced an increase in catalase activity which preceded the increase in chlorophyll content. Chlorotic leaves contained more K than leaves of the treated trees. In the treated leaves the K content decreased before an increase in chlorophyll content occurred. Soluble P content was higher in treated than in chlorotic leaves, but it is considered that the low P content in chlorotic leaves is probably a consequence and not a cause of chlorosis. There was no appreciable difference in Mg content of chlorotic and treated leaves.

248. WOODHAM, R. C.
The chloride status of the irrigated sultana vine and its relation to vine health.
Aust. J. agric. Res., 1956, **7**: 414-27, bibl. 12, illus.

Petioles gave a clearer indication than leaf blades of chloride status from bud burst to mid January. Leaf burn in December ranged from slight to severe with petiole Cl at 0·8%–1·9% and was severe in January at values of 2·5% or more on an undrained loam. On healthy sites no symptoms were apparent in December at values of 1·7% and 2%. Petiole analysis for Cl is particularly valuable where vine health is affected without obvious foliar symptoms. The cases of leaf burn investigated were shown not to be due to B or S, both of which elements were higher in leaves than in petioles.—Commonw. Res. Stat., C.S.I.R.O., Merbein, Vic.

249. STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR. (DALBRO, K.)
Cox's Orangeplet. **(Cox's Orange spot.)**
Erhvervsfrugtavl., 1956, **22**: 386-8.

Experiments and observations have shown that Cox's Orange leaf-spot, which is prevalent in Denmark, especially on young trees, is closely related to the potassium content of the soil, a large number of spots being associated with a high K content. Phosphorus manuring had no influence on the trouble, but generous applications of nitrogen reduced it where the potassium content was high. It was also found that trees on rootstocks susceptible to magnesium deficiency are liable to develop more spots than trees on other rootstocks. The relationship between yields and severity of symptoms has not been studied, but it is believed that an occurrence of the trouble in a mild form need not cause any anxiety to growers.—Blangstedgård Research Station.

250. BOWEN, T. J.
Nutrient disorders in plums.
Qd agric. J., 1956, **82**: 373-6, illus.

Symptoms and the treatment of Zn, Mg and S deficiencies in plums are described. The last causes the trees to be stunted, with leaves mottled at first but gradually becoming completely yellow; the younger leaves are yellow or white. There is little or no secondary growth. J.R.L.

251. HERNANDEZ, E., AND CHILDERS, N. F.
Boron toxicity induced in a New Jersey peach orchard. Part II.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 121-9, bibl. 21, illus.

Previous experiments [see *H.A.*, 26: 3462] were continued, and data are discussed here for 1952 and 1953. Generally speaking trees receiving excess B, particularly the −Mn and −Cu trees, showed delayed and scant blossoming and often malformed fruits. Mn content was highest in fruits from trees which received all nutrients except B. In general the −Zn trees contained appreciably less Mn than was present in leaves of other trees also supplied with Mn. Leaf K was higher in trees not supplied with B. With one exception the N, P, Ca and Mg contents in the leaves were not affected significantly by fertilizer treatments (including excess B). Cu applied to soil slightly increased the leaf Cu content. Zn applied to soil significantly increased leaf Zn content. No correlation was found between Fe soil application and Fe in leaf. Available B in soil in 1952 was highest under the −Mn trees. That in the soil in August 1953 was well below the optimum range for crop growth, indicating that excess soil B of 1950 had disappeared within 3 years.—Rutgers Univ., N. Brunswick.

252. Bell, H. K., and Childers, N. F.
Effects of manganese and soil culture on growth and yields of the peach.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 130-8, bibl. 9, illus.

Manganese deficiency was studied under 3 systems of soil cultivation, namely clean cultivation, sod and sod plus mulch. Trees grown in sod made less growth and yielded less than did mulched or cultivated trees. The Mn deficiency symptoms, which are discussed, are much more obvious on some varieties than on others. Mn deficiency was more pronounced where soil pH values were 6·5 or higher at 0–10 in., 10–20 in., and 20–30 in. depths. It also tended to be more intense in dry than in wet seasons.—Rutgers Univ., N. Brunswick.

253. Schander, H.
Die Bodenmüdigkeit bei Obstgehölzen. **(Soil sickness in the orchard.)**
Reprinted [with addition] from *Gartenbauwiss*, 1955, **2**: 115-40, 233-60 [see *H.A.*, 26: 1521 and 2561], pp. 66, bibl. 93, illus.

This reprint is particularly valuable for the discussion (pp. 51–61)* of more recent work published while the article was being printed; it forms the addition mentioned above. In it work by Grümmer, Oostenbrink, Patrick and many other workers in different parts of the world is discussed.

254. Smith, W. W., Barrat, J. G., and Rich, A. E.
Dapple apple, an unusual fruit symptom of apples in New Hampshire.
Plant Dis. Reptr, 1956, **40**: 765-6, bibl. 4, illus.

Green patches on the skin of mature Cortland and McIntosh fruits and a flattening of the blotchy areas were observed in a single orchard. The symptoms have been observed only on trees with Virginia Crab or Robusta V as intermediate stocks. The cause is being investigated.

Climatic factors.

(*See also* 7, 101, 156, 213, 233, 346f, i, y, 347g, 972, 985.)

255. Hłyń, M., and Suszka, J.
Skutki przymrozków wiosennych 1953 r. w sadzie pomologicznym w Kórniku. **(Observations on the effect of night frosts in the spring of 1953 in the Kórnik orchard.)** [English and Russian summaries 1 p. each.]
Arbor. Kórnickie,† 1955, **1**: 167-88, bibl. 14, illus.

An account is given of spring frost injury to the buds, flowers and fruitlets of many sweet cherry, sour cherry, plum and pear varieties and leaves of apple varieties. The degree of damage usually depended on the development stage at the time of the frost rather than on species or variety, though some cases of varietal resistance were noted. Thus in the sour cherry variety Łutówka (Grosse lange Lotkirsche) only 8% of the pink buds were affected by frost, while in the other sour cherry varieties all or most of the pink buds were frost damaged. Anatomical studies conducted on frost damaged sweet cherry fruits and apple leaves are described and illustrated.

256. Athenstädt, H., Schmadlak, J., and Zahn, F. P.
Über die Frostschäden an Obstgehölzunterlagen im Winter 1953/4. **(Frost injury to fruit-tree rootstocks in the winter of 1953-4.)**
Arch. Gartenb., 1956, **4**: 6-66, bibl. 34, illus.

In the central German plain with prolonged frost (minimum temperature −21° C.) only sensitive varieties of fruit, including blackberry and trained vines, suffered damage to woody tissue in shoots. Damage to roots caused heavy losses. Apple, pear, plum, cherry, peach and apricot rootstocks and grafted trees are classified according to their frost resistance. In one locality the soil was frozen to 60–70 cm. under clean cultivation and 40 cm. under grass sod. Under a mulch of roofing paper frost penetration was reduced to 50–55 cm., under reeds to 18 cm. and under a mixture of straw and potato haulms to 13 cm. In another instance a farmyard manure gave full protection to peach roots.

257. Jacoboni, N.
L'azione del gelo sul pesco considerata su cultivar in Umbria. **(The action of frost on peach trees studied in varieties in Umbria.**
Ital. agric., 1956, **93**: 573-600, bibl. 45, illus.

Frost resistance ranged from high to very low in the varietal order Montecorona, Elberta, Charles Ingouf, E. Crawford, Pieri 81, Early Hale, J. H. Hale. Of flower buds present before the frost 39·49% set fruit in Montecorona and 3·36% in J. H. Hale. In all these varieties the 1- and 2-year-old stems showed damage to phloem and sometimes to xylem, the bud "cushions" being affected as deeply as the medulla. There was no damage to roots, trunks, main or secondary branches. Stamens in flower buds were more frost resistant than pistils.

258. Hirt, W.
Frostschutzberegnung in der Schweiz. **(Irrigation for frost control in Switzerland.)**
Schweiz. Z. Obst- u. Weinb., 1956, **65**: 425-9, illus.

Experience obtained in frost protection with rotary sprinklers is discussed. At present the installations are used to protect vines, apricots, dwarf and half-standard fruit trees, early potatoes, and some flower and vegetable crops.

259. Anon.
Magnetism *v.* frost.
Grower, 1956, **46**: 954, illus.

It is claimed that a new Californian device called the Magna-Tron will protect citrus and other fruit trees from frost damage at temperatures down to 21° F. It consists of a tower 33 ft. high with arms radiating from its foot and buried in the soil, with a booster coil fitted to the end of each. The device harnesses natural currents to create an intensified magnetic field over an acre of orchard; there are no running costs. It is also claimed that its use will reduce the susceptibility of trees to blight, aphids and June drop and increase sugar content of the fruit.

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* Translation available at Bureau.

† Formerly *Prace Zakl. Dendrol. Pomol. Kórniku.*

260. WEINBERGER, J. H.
Prolonged dormancy trouble in peaches in the southeast in relation to winter temperatures.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 107-12, bibl. 6.

The seasonal accumulation of hours of chilling (45° F. or lower) to Feb. 15 gave a correlation of −·91 with the severity of prolonged-dormancy trouble in peaches in the southeast of California. December and January temperatures were the chief influence in the breaking of the rest of peach buds, and the average of the means of these two months when correlated with prolonged-dormancy trouble gave a coefficient of ·93. Converting chilling needs to December-January temperatures thus allows of the predetermination of adaptability of peach varieties with known chilling needs to locations where only mean temperatures are available.—U.S. Dep. Agric., Fresno, Calif.

261. INSTITUUT VOOR TOEGEPAST BIOLOGISCH ONDERZOEK IN DE NATUUR.
Verslag over het jaar 1955. **(Report for 1955.)**
Meded. Inst. toegep. biol. Onderz. Natuur **25**, 1956, pp. 28.

Shelter-belt studies are briefly reported. In Zeeland plots of James Grieve, Cox's Orange Pippin, Jonathan and Golden Delicious on different rootstocks were used. The highest yield increase (160%) due to wind protection was with Cox, and the lowest (32%) with Golden Delicious. In general, little difference was observed in tree height and trunk circumference due to wind protection. Both early and total yields of strawberries were higher in a protected plot.

262. DIJKSTERHUIS, H. P.
Ervaringen met windschermen in het noorden van ons land. **(Experiences with windbreaks in the north of Holland.)**
Fruitteelt, 1956, **46**: 979-81, 981, illus.

In the northern provinces of Holland the species mainly used for fruit protection are Lombardy poplar, willow and alder. Alder is often used for protecting soft fruit. Planting and management practices are described.

263. (GEORGE, E. J.)
Windbreaks take tough trees.
Agric. Res. Wash., 1956, **5**(1): 7, illus.

Boxelder [*Acer negundo*], green ash [*Fraxinus lanceolata*] and the shrubby silver buffalo-berry [*Shepherdia argentea*] were the only tree species of those tested which met the requirements for hardiness in the Northern Great Plains. A spacing of 4 feet in the row and 12 feet between the rows was the minimum for success. The best windbreak was obtained in unpruned plots, but some pruning of the interior rows of trees is recommended. Cultivation should be practised for as long as possible, but mulches were not found to be desirable.

264. HAYASHI, S., AND WAKISAKA, I.
Studies on "yuzuhada" disorder of fruits of Nijisseiki pear (*Pyrus serotina*.). II. Development of "yuzuhada" as related to water deficit. [Japanese, with English summary $\frac{1}{3}$ p.]
J. hort. Ass. Japan, 1956, **25**: 116-24, bibl. 15, illus.

The development of the black-end disorder was studied in Nijisseiki pear trees with reference to daily changes in fruit growth accompanied by a water deficiency in the leaves. Water deficiencies were always greater in trees with black-end than in healthy trees, even when irrigated. Higher osmotic pressures were found in leaves of trees with the disorder. Fruit of trees in soil which was kept dry from May to August showed symptoms of the disorder by the end of June or in July. Fruits in which artificial water deficiencies were induced later showed black-end symptoms; thus it is concluded that the disorder develops as a result of the abnormal shrinkage caused by a natural water deficiency. Nijissieki pears grafted on *Pyrus betulaefolia* showed less black-end than those on *P. serotina*. [For part I see *H.A.*, 26: 1532.]

Viruses.

(*See also* 346j, 347f.)

265. BIOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.
Stony-pit of pears.
Agric. Gaz. N.S.W., 1956, **67**: 305-7, illus.

Stony-pit, a virus disease of pears, causes malformation of the fruit with stony brown pits in the depressions. Where the disease is severe the bark of the tree may have longitudinal cracks and folds so that it resembles oak-bark. Infected wood used for propagation is the only known way by which the disease is spread. Williams is usually less severely affected than most other varieties, and infected trees can often be successfully worked over to it. J.R.L.

266. POSNETTE, A. F., AND CROPLEY, R.
Virus diseases of cherry trees in England. II. Growth suppression caused by some viruses.
J. hort. Sci., 1956, **31**: 298-302, bibl. 9, illus.

Two experiments are described in which mazzard F12/1 plants were inoculated with the cherry viruses rugose mosaic, rusty mottle, tatter leaf, rasp leaf, necrotic line pattern and ring mottle. The height, stem girth and weight of the control plants were significantly greater than those of the plants inoculated with each of the 6 viruses. The reduction in plant weight, 4 years after inoculation, ranged from 15% (ring mottle) to 57% (rasp leaf). The weights of the plants infected with each of the viruses were more variable than those of the control plants. [Authors' summary.] —E. Malling Res.Stat. [For part I see *H.A.*, 24: 1328.]

267. GRAY, E. G., AND EVERETT, H. F.
Serious breakdown of gooseberries.
Gdnrs' Chron., 1956, **140**: 403, bibl. 1, illus.

Some gooseberry bushes of the varieties "Macherauch's Seedling" and "Matchless" growing in the variety collection at Craibstone Farm, North of Scotland Agricultural College, have developed deeply lobed leaves resembling those of hawthorn. The new growth on affected bushes is poor and the crop small. Graft tests are in progress to see whether the disorder is the same as that recorded at Brodie Castle, Morayshire, which is believed to be caused by a virus.

J.R.L.

268. Harrison, B. D.
Soil transmission of Scottish raspberry leaf-curl disease.
Nature, 1956, **178**: 553, bibl. 3.

In May 1955 raspberry cuttings were potted in soil collected from the site of a recent severe outbreak of raspberry leaf-curl. In May 1956 15 out of 32 plants showed symptoms of the disease and inoculation with sap extracted from the leaves of each of these plants produced local lesions in *Chenopodium amaranticolor*. A virus of the tobacco necrosis type not previously recorded in raspberry was also isolated from diseased plants grown in the infected soil. From these experiments and from further work on sugar beet it is concluded that raspberry ringspot virus, the pathogen of leaf-curl disease, and other viruses of the tobacco-ringspot type are commonly transmitted through the soil.—Scottish hort. Res. Inst., Invergowrie, by Dundee.

269. de Fluiter, H. J., and van der Meer, F. A.
De dwergziekte van de framboos, haar verspreiding en bestrijding. **(Rubus stunt of raspberry, its spread and control.)** [English summary 2 pp.]
Reprinted from *Meded. LandbHoogesch. Gent*, 1955, **20**: 419-34, bibl. 9, illus.

The biology of *Macropsis fuscula*, the vector of Rubus stunt, has been studied. Infection of the plants occurs in July, August and September. The disease may be controlled by destruction of the virus by heat treatment, roguing infected plants or controlling the vector. In laboratory and field experiments overwintering leafhopper eggs were killed by spraying the canes in January or February with tar oil or DNC preparations. Young larvae were controlled by a spring spray of parathion. In field experiments the occurrence of Rubus stunt in first-year plants was greatly reduced by fortnightly sprays of parathion from May to October. [See also *H.A.*, 26: 2580.]—Inst. Ziekt. Onderz., Wageningen.

270. Cosmo, I.
La degenerazione infettiva della vite. **(Infectious degeneration of the vine.)**
Riv. Vitic. Enol., 1956, **9**: 235-41, bibl. 2, illus.

A brief report is given of a conference called by L'Office International du Vin (O.I.V.) on the disease. It was decided to retain the name "infectious degeneration". There was doubt whether leaf rolling was a constant symptom.

271. Pieri, G.
La "malattia del midollo" della vite. **(Pith disease of vines.)**
Riv. Vitic. Enol., 1955, **8**: 352-3, bibl. 1.

The account includes a summary of an article by . Cunin in *Revue Agricole de l'Afrique du Nord*, 54, Nos. 1806–8. The disease has numerous features in common with infectious degeneration and may be identical with this. Preventive measures include choice of vigorous stock, disinfection of wounds and avoidance of heavy soils. In damp regions affected vines are sprayed after pruning with 10% [*sic*] sulphuric acid, or with a proprietary mixture containing 1·5% of arsenious acid. Old vines are not often attacked, but can be treated as above if necessary. Where the disease has penetrated below soil level the affected part is cut away and a new scion grafted on the stump.

272. Verona, O.
Due parole sulla cosidetta malattia di Pierce. **(A note on the so-called Pierce's disease.)**
Riv. Vitic. Enol., 1955, **8**: 149-53.

The history, cause, symptoms, epidemiology and transmission of the disease are briefly reviewed. A list of other hosts is given. No curative measures are known, and control is attempted by concentrating on the insect vectors and on weed control.

273. Harmon, F. N.
White Emperor virus in Cardinal and Red Malaga grapes.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 302-3, bibl. 3.

Certain Cardinal grape vines bearing undercolored fruit were observed in field plantings. Transmission tests indicated that the condition was caused by the white Emperior virus. These vines apparently became infected from 1,613 rootstocks to which they were grafted. Inoculations also indicated that white Emperor virus infected Red Malaga and possibly Ribier. Healthy vines showed fruit and foliage disease symptoms within one year of inoculation. [Author's summary.]—U.S.D.A., Fresno, Calif.

274. Scaramuzzi, G.
Polimorfismo sintomatologico del complesso virosico del mandorlo conosciuto come mosaico in Puglia. Parte 1. **(Symptomatological polymorphism of the almond virus complex known as mosaic in Apulia. Part 1.)** [English summary ½ p.]
Ann. Sper. agrar., 1956, **10**: 1707-43, bibl. 2, illus.

Diseased trees are characterized by dwarfed side shoots with crowded leaves. The extensive variations in the form of the yellowish discoloration of the leaves are described. The virus group is probably identical with the "line-pattern" complex, and variability of symptoms may be due either to varietal reaction or to temperature effects.

Bacteria.

(*See also* 976.)

275. Bošković, M.
Suzbijanje korenovog raka na voćnim sadnicama. **(A contribution to the control of root canker on fruit-tree seedlings.)** [English summary 1½ pp.]
Zasht. Bilja, 1955, No. 31, pp. 33-44, bibl. 14, illus.

Tumours due to *Bacterium tumefaciens* were removed from infected pear seedlings and the wounds treated with chemical disinfectants. The chemicals were more effective on slightly-attacked plants, the most successful material being Ceretan (1%). Ether was an effective therapeutant for infected pear seedlings. There was no marked effect of lengthening the interval between root pruning of apples and inoculation before planting on the incidence of infection.—Inst. agric. Res., Novi Sad.

276. Dye, D. W.
Blast of pear.
Orchard. N.Z., 1956, **29**(7): 5, 7, illus.

Blackening of pear blossom and young fruit was found to be caused by *Pseudomonas syringae*, and the symptoms of infection are described. In trials with Winter Nelis sprays of bordeaux and streptomycin were applied at open cluster, full bloom and petal fall. Bordeaux did not control blossom blast in either trial, and it caused excessive drop of fruit in the second trial. Streptomycin did give considerable control of blossom blast, but yield was not increased in the same proportion.—D.S.I.R., Auckland.

277. Dye, M. H.
Intake of streptomycin by peach leaves.
Nature, 1956, **178**: 551-2, bibl. 4.

The work outlined shows that streptomycin can enter peach leaves following foliar application, but no evidence has been obtained that the antibiotic becomes truly systemic. *Pseudomonas syringae* and *Bacillus subtilis* were used as test organisms.

Fungi.

(*See also* 78, 90, 346a, c, k, l, r, 347c.)

278. Jovićević, B., and Djurdjević, B.
Prilog proučavanju suzbijanja pepelnice jabuka sumporno-krečnom čorbom. (**Control of *Podosphaera leucotricha* by a lime sulphur mixture.**) [English summary 1 p.]
Zasht. Bilja, 1955, No. 31, pp. 61-7, bibl. 5.

Recently the occurrence of mildew on Jonathan and Seling's Orange Pippin in the region of Peć has increased. One pre-blossom and two post-blossom sprays of lime sulphur (30° Bé.) gave better mildew control than 2 sprays, one full-bloom and the other post-bloom. Concentration and number of sprays was considered to have little effect on mildew occurrence, timing being the most important factor.—Inst. agric. Res., Peć.

279. Foschi, S., Carlotti, G., and Mattarelli, D.
Gli "scopazzi" del melo. (**Witches' brooms on apple trees.**)
Reprinted from *G. Agric.*, 1955, No. 7, pp. 5, bibl. 9, illus.

In numerous trees examined in 3 districts in Italy witches' brooms were associated with the presence of powdery mildew, *Podosphaera leucotricha*. Evidence is examined for attributing the cause of witches' brooms on apple to this fungus rather than to a virus. The disease was not transmitted to pear scions grafted on affected apple stocks. Further work is in progress.

280. Köhler, H., and Fritzsche, R.
Wirkung von antibiotikumhaltigen Kulturfiltraten von Angehörigen der *Streptomyces-albus*-Gruppe auf den Apfelmehltau und Spinnmilben in vivo. (**The effect on apple mildew and spider mites *in vivo* of culture filtrates containing antibiotics from members of the *Streptomyces albus* group.**)
Reprinted from *Anz. Schädlingsk.*, 1956, **29**: 65-8, bibl. 5, illus.

In both laboratory and field trials culture filtrates of *Streptomyces* were active against apple mildew (*Podosphaera leucotricha*) and spider mites (*Metatetranychus pilosus* and *Bryobia praetiosa*).

281. Heuberger, J. W., Romanko, R. R., and Sayed, M. Q.
Control of *Botryosphaeria* rot and sooty blotch on apples.
From abstr. in *Phytopathology*, 1956, **46**: 467.

In 3 years' trials in Delaware captan, zineb, captan + zineb (half strength of each) and captan and zineb applied alternatively caused substantial reductions in the rot incited by *Botryosphaeria ribis*, but only zineb and captan + zineb were effective against sooty mould *Gloeodes pomigena*).

282. Rabe, W.
Studies on the action of wettable sulphur against conidia of *Venturia inaequalis* (Cke.) Wint.
Höfchen-Briefe (English edition), 1956, **9**: 1-68, bibl. 121, illus.

Eight single conidial cultures of *Venturia inaequalis* were classified as 2 different types, and the 2 strains EK 4/53 and EK 7/53 were found to differ in their sensitivity to fungitoxic substances. Test on efficiency, persistence and adherence showed that the most favourable particle size of wettable sulphur used for scab control is 1–4 μ diameter, with a maximum effect at 1–2 μ diameter.

283. Kienholz, J. R.
Control of bull's-eye rot on apple and pear fruits.
Plant Dis. Reptr, 1956, **40**: 872-7, bibl. 13, illus.

Bull's-eye rot, caused by either *Neofabraea malicorticis* or *N. perennans*, often causes serious losses on apple and pear fruits in cold storage. The role that winter injury to apple trees and periods of rainfall play in fruit infection cycles in the Pacific Northwest is shown. The discovery that latent infections may develop in young fruits explains why the sprays used prior to 1950 sometimes failed to control the fruit rot. A more effective program for fruit rot control is suggested as a result of recent spray tests [notably with ziram]. [Author's abstract.]—Agric. Res. Serv., U.S.D.A., Hood River, Ore.

284. Gallucci-Rangone, M. M.
Un'infezione da *Gloeosporium fructigenum* Berk. su mele e pere conservate in magazzino. (**An infection of stored apples and pears by *Gloeosporium fructigenum*.**) [English summary ½ p.]
Ann. Sper. agrar., 1956, **10**: 1677-90, bibl. 17, illus.

e fungus, probably the *germanica* strain, produced own spots on the fruit. It was transmitted artiially to injured apples, pears and bananas, but gave gative results with lemons and grapes. Only the in was affected in bananas, but the flesh was affected apples and pears. Uninjured fruit did not become ected.

85. Corke, A. T. K.
Bitter rot of apples. II. Seasonal variations in the development and sporulation of cankers of *Gloeosporium* spp. inoculated into apple branches.
J. hort. Sci., 1956, **31**: 272-83, bibl. 15, illus.

sults reported in an earlier paper [*H.A.*, 26: 365] ve been generally confirmed. Monthly inoculations Cox's Orange Pippin shoots have shown that *oeosporium perennans* can most readily invade althy tissue during the winter. Cankers induced ring this season continued to grow until the following tumn, whereas cankers induced during the summer re rapidly and permanently isolated by callus. These ults, together with data on sporulation, are discussed relation to the time of pruning. Pending the results work on the protection of fruit against *G. perennans* is suggested that measures recommended for the ntrol of cankers of *Nectria galligena* would be most ely also to reduce the incidence of bitter rot fungi. oculations with *G. album* showed that this species not parasitic on wood, and its frequent occurrence fruit is attributed to its ability to exist saprotically at other times.—Long Ashton Res. Stat.

86. Lovisolo, O.
Le monilie dei fruttiferi. 1. Segnalazioni di nuovi ospiti ed osservazioni su alcuni di quelli già noti. (***Monilia* species on fruit trees. 1. Reports of new hosts and observations on some of those already noted.**) [English summary ¾ p.]
Boll. Staz. Pat. veg. Roma, 1955 (issued 1956), **13**: 7-40, bibl. 69, illus.

w hosts of *Monilia fructigena* reported from Piednt are *Amelanchier canadensis*, *Pyrus sieboldii*, *ataegus oxyacantha* and *Cornus mas*. Fruits of *nus cerasifera* var. *pissardii* were attacked by *laxa*. Infections of *M. fructigena* are described for el, fig, persimmon, medlar, grape and blackberry. *unus nana* (ornamental) is a host of *M. laxa*, and *spinosa* of both *Monilia* spp. Damage to trees and it of apple, pear, quince, cherry, peach, plum and nond by these pathogens is described.

87. Foschi, S.
La ruggine del pero. (**Pear rust.**)
Inf. fitopat., 1956, **6**: 252-3, illus.

e damage done to pear trees by the fungus *Gymnorangium sabinae* and the part played in its life le by *Juniperus* spp. are described. Control easures include removal of junipers and use of copper sulphur fungicides.

88. Daines, R. H., and Cohoon, D. F.
Peach canker study reveals facts necessary for controls.
N.J. Agric., 1956, **38**(3): 14-16, illus.

ach cankers caused by *Fusicoccum amygdali* develop oughout the year, and infestations starting in spring, summer and autumn were studied. Tests were made to determine the effect of temperature on the development of resistance to infection by young trees after defoliation. Leaf scars became increasingly more resistant to infection as the time from defoliation increased. Resistance was developed more quickly at higher (80° and 67° F.) than at lower temperatures.

289. Rossetti, V., and Maltese, A. E.
O cancro dos ramos do pessegueiro. (**Canker of peach branches.**)
Biológico, 1956, **22**: 57-62, bibl. 7, illus.

Artificial transmission of the disease (caused by *Fusicoccum amygdali*) by inoculation with affected tissue and with pure cultures was successful through bark wounds and fruit-skin wounds. Introduction of spores into shoots and buds produced no result. Control experiments with fungicides are in progress. Bordeaux mixture, even at half the usual concentration, produced burns on the leaves.

290. Grosclaude, C.
Recherches sur le chancre du pêcher causé par *Fusicoccum amygdali* Delacroix. (**Studies on peach canker caused by *Fusicoccum amygdali*.**)
Ann. Épiphyt., 1956, **3**: 397-419, bibl. 14, illus.

The fungus was first reported in France on almonds in 1905 and has since affected peach trees in S.W. France. Susceptible varieties are listed, the most seriously affected being Arp Beauty and J. H. Hale. Copper and sulphur fungicides give very little control and other measures are being studied.

291. Glasscock, H. H., and English, W. S.
Control of black currant leaf spot by spraying with oil-bordeaux mixture.
Plant Path., 1956, **5**: 97-8, illus.

In preliminary trials black currant bushes sprayed with summer white-oil bordeaux retained their leaves longer than when treated otherwise or in the controls. When oil-bordeaux was sprayed twice, viz. after flowering and after picking, the bushes retained the leaves longer than those sprayed once, or not at all. On bushes sprayed twice a year for 3 years there was also a marked increase in weight and quality of fruit over the controls. —N.A.A.S., Wye, Kent.

292. Miller, P. M., and Stoddard, E. M.
Field control of grey mold of strawberries.
Plant Dis. Reptr, 1956, **40**: 788-9, bibl. 7.

In field trials 3 applications of thiram, dichlone or captan, starting at flowering and spaced at intervals of 10–14 days, reduced the number of fruits infected by grey mould. Dichlone and thiram gave about equal control and both possessed long residual action. —Conn. agric. Exp. Exp. Stat., New Haven.

293. Goode, P. M.
Infection of strawberry roots by zoospores of *Phytophthora fragariae*.
Trans. Brit. mycol. Soc., 1956, **39**: 367-77, bibl. 7, illus.

Observations were made on zoospores of *Phytophthora fragariae* and on cyst formation. The germination of cysts situated at the root tip was followed by penetration of the root both in strawberries and in non-host plants. Except in susceptible strawberry cultivars, however, penetration did not extend beyond the epidermal layer.—Dep. Bot., Univ. Birmingham.

294. Wilhelm, S.
Control of verticillium wilt of chrysanthemum and strawberry. . . . by soil fumigation with chloropicrin.
Down to Earth, 1956, **12**(2): 12-15, bibl. 7, illus.

Fumigation with 3 ml. of chloropicrin per sq. ft. before planting gave very good control of verticillium wilt on both chrysanthemum and strawberry. [See also *H.A.*, 26: 3532.]

295. Cosmo, I.
La lotta antiperonosporica ad una svolta. **(A turning point in control of *Plasmopara viticola*.)**
Riv. Vitic. Enol., 1955, **8**: 96-102, bibl. 14.

Non-cuprous fungicides are listed and recent work on their use against downy mildew of vines is reviewed. The advantages and disadvantages of Dithane and captan are discussed.

296. Casarini, B.
L'attacco peronosporico nelle prime fasi di vegetazione della vite. **(Downy mildew attack in the first growth phases of the vine.)**
Ital. agric., 1956, **93**: 601-6, illus.

Transplants of Panse precoce vines with unexpanded leaves placed near adult vines severely affected by *Plasmopara viticola* unexpectedly became heavily infected on most of their shoots. Inoculation in autumn and winter resulted in rapid and severe infection immediately following the opening of buds. The variety Cabernet was almost completely resistant and Muscat of Hamburgh was only slightly infected following inoculation.

297. Emiliani, G.
Prove di sperimentazione antiperonosporica: anno 1955. **(Experimental tests for control of downy mildew of vine in 1955.)** [English summary ⅔ p.]
Boll. Staz. Pat. veg. Roma, 1955 (issued 1956), **13**: 171-91, bibl. 27.

Fungicides were applied at approximately 8-day intervals from early May to early October. Their efficiency was assessed in late July and mid-August. The first assessment gave a decreasing order of efficiency for Ortho (captan plus copper), bordeaux mixture, Aspor (zineb), cupreous Dithex (zineb plus copper). The later survey changed the order to Aspor, bordeaux mixture, cupreous Dithex, Ortho. Differences in the second estimation were not significant, but in the first Dithex was significantly inferior to both Ortho and bordeaux mixture. Grape quality was improved by Dithex, but Ortho imparted an unsatisfactory flavour.

298. Luickij, G. D.
New fungicides for downy mildew control on vines. [Russian.]
Vinodelie i Vinogradarstvo, 1956, No. 4, pp. 39-40.

Fuklasin (20% ferric dithiocarbolinic acid) at 1 and 2% concentrations was almost as effective against downy mildew as 1% bordeaux, and considering its other advantages it could replace the latter. Dinitrorodanbenzol at 1 and 1·5% with copper was less satisfactory.

299. Pieri, G.
Peronospora dell'acino e colpo di pollice. **(Downy mildew and "thumb print" disease of grapes.)**
Riv. Vitic. Enol., 1955, **8**: 207-8, bibl. 4.

The symptoms of both diseases are described. Possible causes of "thumb print" are discussed; the most probable causes are either sudden changes of temperature or internal physiological disturbances. Sulphur-copper treatment is recommended for downy mildew.

300. C[osmo], I. (Vidal, J. L.)
Trattamento curativo contro l'oidio. **(Curative treatment of powdery mildew.)**
Riv. Vitic. Enol., 1955, **8**: 173-4, bibl. 1.

A brief summary is given of an article from *La Viticulture Nouvelle*, 1955, **82**(8): 37-9, by J. L. Vidal, stating that spraying with 0·125% potassium permanganate does not give the degree of control commonly attributed to it. Immersion of mildewed grapes in solutions of potassiun permanganate did not wet the fungus, neither did application of the solution under pressure. There is no commonly used wetting agent suitable for mixing with potassium permanganate.

301. Pieri, G.
Prove contro l'oidio della vite. **(Tests on control of vine powdery mildew.)**
Riv. Vitic. Enol., 1955, **8**: 142-3, bibl. 1.

Cosan, a wettable sulphur product of German origin, proved equal or superior to volatile sulphur in controlling powdery mildew both for prevention and cure. The optimal concentration, 0·2%, was considerably lower than that for most sulphur suspensions.

302. Urquijo, P., Santaolalla, G., and Veiga, M. J.
Tratamiento contra el mildio de la vid. **(Treatment for control of vine powdery mildew.)**
An. Inst. nac. Invest. agron. Madrid, 1955, **4**: 783-5.

Complete control of powdery mildew in the 4 varieties treated was attained by spraying, before and during flowering, with either Cupravit or Viricobre at 0·5%, or with 2% bordeaux mixture with or without Thiovit or karathane. Oleocobre at 0·625% controlled the disease except in the highly susceptible variety Mencía, but induced slight curling of the leaves. Control was almost complete with DZ-78 at 0·3%, Gesacobre at 0·8% and Cuprosan at 0·4%, but Mencía was again affected.

303. Comuzzi, A.
Rimedi contro lo sviluppo delle muffe nella forzatura degli innesti ed in vivaio. **(Measures for control of moulds in the forcing of scions and in the nursery.)**
Riv. Vitic. Enol., 1955, **8**: 45-8, bibl. 2, illus.

Moulds, particularly *Botrytis*, were completely controlled on vine grafts in forcing frames and nurseries by 4 applications of either Caffaro (powdered copper oxychloride and lime) or B 500 (a powder containing chloro-bromo-oxyquinoline). Grafted cuttings were dusted immediately before stratification. Their tops were treated on installation in frames and again as oon as green shoots appeared. They were finally eated over their whole length when planted in the ursery.

304. Converse, R. H.
Eradication of pecan scab on nursery trees.
Plant Dis. Reptr, 1956, **40**: 870-1, bibl. 2.

our fungicides were applied to dormant nursery ecan trees, which were badly affected by scab (*Cladoporium effusum*) in an attempt to prevent sporulation f overwintering stromata. Fair control was obtained ith Puratized Agricultural Spray and with Santobrite lus dormant oil, but not with Stauffer N-521 or abam.—Okla. agric Exp. Stat., and U.S.D.A., Stillater. [See also *H.A.*, 26: 2615.]

Nematodes.

(*See also* 212, 346m.)

305. Hansen, C. J., Lownsbery, B. F., and Hesse, C. O.
Nematode resistance in peaches.
Calif. Agric., 1956, **10**(9): 5, 11, illus.

n a peach seedling study a high degree of resistance to *Ieloidogyne incognita* var. *acrita* was found to be resent in the peach rootstocks Shalil and S-37. Open-ollinated seedlings of Shalil, S-37 and several hybrid opulations produced only resistant seedlings. No each stock tested showed a similar degree of resistance *M. javanica*, but resistance may possibly be obtained y selection. Lovell gave seedlings that were very usceptible to both nematode species.

306. Parker, K. G., and Mai, W. F.
Damage to tree fruits in New York by root lesion nematodes.
Plant Dis. Reptr, 1956, **40**: 694-9, bibl. 8, illus.

eenhouse inoculation tests showed *Pratylenchus netrans* to be pathogenic to Mazzard cherry roots e also *H.A.*, 26: 2670]. Evidence was obtained of bstantial damage to apple trees and moderate mage to peach roots. A limited survey has indicated at the nematode problem is greatest in light-textured ils.—N.Y. St. Coll. Agric., Cornell Univ.

307. Davidson, J. H., and Dieter, C. E.
Soil fumigation for soil borne plant parasitic nematodes in fruit tree nursery soil.
Down to Earth, 1956, **12**(2): 26-9, illus.

n searching for an explanation of reduced growth of herry trees on Mahaleb seedling rootstocks in a Aichigan nursery it was found that a high population f the root lesion nematode (*Pratylenchus* sp.) was resent in the soil. In 2 experiments pre-planting soil umigation with Dowfume W-85 (ethylene dibromide) t 6, 9 and 12 gal. per acre resulted in greatly improved rowth of the seedlings and later of budded Napoleon herry trees, and a reduction in the population of the ematodes. Autumn treatment was found to be referable to spring treatment and the highest rate of pplication gave the highest monetary return.

308. Raski, D. J.
***Pratylenchus penetrans* tested on strawberries grown in black-root-rot soil.**
Plant Dis. Reptr, 1956, **40**: 690-3, bibl. 11, illus.

Strawberry plants were grown in soil from a strawberry field infested with black root rot and from an adjacent apple orchard. Nematode populations were markedly reduced by fumigation with EDB and were eliminated by DD fumigation. Growth in apple orchard soil was improved after chloropicrin fumigation although root-lesion nematodes were not present. No significant variation in fresh weight of strawberry plants was observed at various levels of nematode inoculation. Plants in untreated field soil were severely damaged and had blackened roots, while roots of those in chloropicrin-treated soil were uniformly healthy and white. Damage to plants grown in apple orchard soil and DD-treated field soil was intermediate in severity.—Univ. Calif. Exp. Stat., Davis.

309. Lownsbery, B. F.
***Pratylenchus vulnus*, primary cause of the root-lesion disease of walnuts.**
Phytopathology, 1956, **46**: 376-9, bibl. 15, illus.

Experiments with screened suspensions of *Pratylenchus vulnus* showed that this nematode is the primary cause of root-lesion disease on *Juglans hindsii*. The disease was induced by growing seedlings of *J. hindsii* in soil from an affected orchard. Air-drying this soil eliminated *P. vulnus* and the disease. Leaves from diseased seedlings had a lower potassium content than leaves from healthy seedlings.—Univ. Calif., Davis.

310. Page, G., and Jensen, H.
Soil fumigation equipment for nematode control.
Stat. Bull. Ore. agric. Exp. Stat. **555**, 1956, pp. 19, illus.

The different methods of applying soil fumigants, from pouring the material into a trench and covering with soil to the use of various types of power-drawn machines are discussed. There is a description with diagrams of a new blade-type applicator developed at Oregon State College. J.R.L.

Mites.

(*See also* 280, 324, 326, 346h, p, 347b, h, 573, 786.)

311. Foschi, S.
Il "ragno rosso" delle piante da frutto.
(The red spider mite of fruit trees.)
Ital. agric., 1956, **93**: 673-8, illus.

The biology of the mite and the damage done to fruit trees are described. Approximately 20% of the winter eggs resist treatment with oily dinitrobutylphenol products. Spring and summer treatments are more important. Among sulphurated organic acaricides Aramite, containing 2-(*p*-butylphenoxy)-isopropyl 2-chloroethyl sulphite, gave optimal control when mixed with an ovicide of the same group. Although inactive against winter eggs Ovotran (*p*-chlorophenyl-*p*-chlorobenzenesulphonate) gave complete control of summer eggs and remained active for about 15 days. Murvesco, a similar compound, was equally effective and is said to have a sterilizing action on the female mites and the power of penetrating from the upper to the lower surfaces of leaves or *vice versa*. Genite (2,4-chlorophenylbenzenesulphonate) is intended to kill winter eggs, but has not yet been tested on a large scale. Phosphoric esters such as Malathion have given good results when replacing the phytotoxic Aramite in mixtures with ovicides, but recent instances of ineffectiveness have been reported. Similar modification of the original high promise of Cloropacide (a derivative of phosphorylacetic acid and a chlorobenzilate) is indicated.—Osserv. fitopat., Bologna.

312. Lienk, S. E., Chapman, P. J., and Curtis, O. F., Jr.
Responses of apple trees to mite infestations: II.
J. econ. Ent., 1956, **49**: 350-3, bibl. 2.

The effect of infestations of European red mite (*Metatetranychus ulmi*) and of two-spotted spider mite (*Tetranychus telarius*) were studied for a second year [for part I see *H.A.*, 23: 2849]. Infestations were much lower than in the previous year. In one orchard flowering of the infested trees was 75% lighter in Cortland and 34% lighter in Red Delicious in comparison with the mite-free trees, and yields were reduced by 64·8% and 35% respectively. The reductions were due almost entirely to red mite infestation of the previous year. Trunk girth measurements showed no appreciable differences between mite-free and infested trees.—N.Y. St. Agric. Exp. Stat., Geneva.

313. van de Vrie, M.
Over de invloed van spintaantasting op de opbrengst en groei van vruchtbomen. **(The effect of red spider mite infestations on yield and growth of fruit trees.)** [English summary 1 p.]
Tijdschr. PlZiekt., 1956, **62**: 243-57, bibl. 24, illus.

Two plots of apple trees (Goudreinette and Yellow Transparent) which were attacked by red spider mite (*Metatetranychus ulmi*) were used. An acaricidal spray was applied to the Goudreinette plots at different times in the summer. Part of the Yellow Transparent plot was sprayed in May, the remainder being left untreated. Reduction in fruit size resulted from mite damage early in the season. There was a slight indication that the fruit became yellower with increasing severity and duration of attack. A delay in applying measures resulted in earlier leaf-fall, lower average shoot length and fewer flower clusters the following year. Reduced flowering capacity was also apparent in the unsprayed Yellow Transparent trees.—I.P.O., Wageningen.

314. Massee, A. M., and Austin, M. D.
Investigations on the control of the fruit tree red spider mite, *Metatetranychus ulmi* Koch. II. Control by delayed-dormancy petroleum.
J. hort. Sci., 1956, **31**: 239-43, bibl. 3.

In three years' trials delayed-dormancy applications, made in mid-March, of 3 and 5% stock oil emulsion and miscible petroleum both considerably reduced the hatching of winter eggs and the initial populations of mites and summer eggs. However, the effect of the washes lasted only for about 3 months, and by the end of July the populations of mites and eggs had evened out. Only in one season out of the three were the crop weights fron the treated plots significantly higher than those from the controls. There were no differences between the two ovicides.—E. Malling Res. Stat.

315. Edgar, E. C.
Developments in the control of red spider mites.
Outlook on Agric., 1956, **1**: 16-19, bibl. 5.

A new acaricide R6199 (the oxalate of 0:0′-diethyl-S-β-diethylaminoethyl phosphorothiolate) has been discovered and tested for the control of red spider mites at Jealott's Hill with outstanding results. In laboratory tests it gave a complete kill of mites as a contact spray of 3 p.p.m., and residual toxicity was high. The spray was shown to be relatively non-toxic as a contact and residual poison against several insects, and probably many red spider predators may be unharmed at acaricidal concentrations. In field trials single applications of 20 or 40 p.p.m. in June gave almost complete mite control, with practically no build-up of population afterwards. When applied in August to a severely-infested plot, a spray of 40 p.p.m. reduced mite population from 148 to 0·1 per leaf in 12 days, and 40 days after spraying no living mite could be found. In 1955 in "growers" trials R6199 gave almost complete control at 20 and 40 p.p.m., and was superior to parathion, Systox and Ovotran applications. The spray has also controlled mites on citrus. Residues in the fruit are not likely to be important, but the spray has a high mammalian toxicity.

316. Della Bella, D., and Rota, P.
Esperimenti con R. 6199 nel 1955. **(Experiments with R. 6199 in 1955.)**
Boll. Zool. agrar. Bachic., 1955, **21**: 221-9, bibl. 7.

Spraying twice between late March and late April with the organic phosphorus product R. 6199 at 30 p.p.m. gave complete freedom from red spider mite in cordon-trained apple trees until mid August, when a further treatment cleared the trees for the rest of the season and almost completely prevented the laying of winter eggs by mites from infested controls. A single application of R. 6199 in May to infested trees gave almost complete disinfestation in 15 days when at 30 p.p.m. and in 4–5 days when at 50 p.p.m. The lower concentration was only effective until mid-July and did not completely protect the trees adjacent to the controls, whereas the higher concentration protected all treated trees until mid-August. There was no advantage in using a wetting agent. This acaricide was miscible with calcium arsenate, carbamates of iron and zinc, parathion, dieldrin, endrin, SR-406 and bordeaux mixture, none of which affected its action. A single treatment at 30 p.p.m. controlled *Bryobia praetiosa* on apple and *Tetranychus telarius* on vine.

317. Barker, J. S., and Maughan, F. B.
Acaricidal properties of Rohm and Haas FW-293.
J. econ. Ent., 1956, **49**: 458-60, bibl. 2.

The results of a replicated experiment with the proprietary acaricide FW-293 at 3 levels of both wettable powder and emulsion concentrate against *Metatetranychus ulmi* and *Tetranychus telarius* on 4 varieties of apple are given. The most effective treatment was emulsion concentrate at 0·8 lb. per 100 gal. which gave full control for the whole season. At equal conentrations the emulsion concentrate was more satisactory than the wettable powder.

318. King, D. R., and Rosberg, D. W.
Control of *Tetranychus hicoriae* McG. on pecans.
J. econ. Ent., 1956, **49**: 404-5, bibl. 1.

ertain insecticidal and fungicidal applications resulted n increased mite populations on pecan trees. The ddition of 6 lbs. of sulphur per 100 gal. of water to DDT applied for control of pecan nut casebearer revented the development of severe mite infestations. ineb applied for scab control also inhibited mite uild-up.

319. Tomašević, B.
Carpoglyphus lactis L. na suvim šljivama. (***C. lactis*** **on dry prunes.**) [English summary ½ p.]
Zasht. Bilja, 1956, No, 33, pp. 57-65, bibl. 3, illus.

Mites observed on stored prunes were identified as *arpoglyphus lactis*. Temperature, humidity and moisure content of the fruit were found markedly to affect his pest. Exposure to 80° C. for 15 min. gave 100% nortality but treatment at 85° C. for 30 min. is conidered more certain. Fumigation with 10 g. of SO_2 er cu. m. for 45 min. was also very effective. Some nites deep inside the fruit, however, survived this treatment which, therefore, should be repeated after 4–5 days.

Insect pests.

(*See also* 346e, g, o, p, q, s, w, x, 347i.)

20. Dürr, H. J. R.
The control of the Argentine ant (*Iridomyrmex humilis*) by means of DDT, chlordane and dieldrin.
Reprinted from *J. ent. Soc. south. Afr.*, 1955, **18**: 7-12, bibl. 10.

ethods of controlling *Iridomyrmex humilis* were ested in trellised vineyards under winter rainfall conitions. Insecticides were applied as barrier sprays the lower parts of the trunks, trellis supports and chor wires. Results showed that dieldrin was uperior to DDT and chlordane. The lowest concenation of dieldrin used (0·5%) controlled the ants for least 14½ months, so that the mealy bug population as also effectively controlled.

321. Monastero, S.
I recenti progressi nella lotta contro la formica argentina (*Iridomyrmex humilis* Mayer.), con particolare riguardo all'uso dei prodotti organici di sintesi. (**Recent advances in control of the Argentine ant *Iridomyrmex humilis*) with special reference to the use of synthetic organic products.**)
Not. Mal. Piante, 1956, Nos. 37-8, pp. 125-48, bibl. 50.

he biology of the species and its distribution in Italy d Sicily are described. Examples are given of its couragement of citrus scale pests and destruction their natural enemies. The relative merits of various secticides as control agents are discussed, the evidence ggesting that chlordane, aldrin, dieldrin and heptalor are more effective than DDT or BHC.

322. Sidor, C.
Zaštita mladih vinograda od grčica na peskovima u Vojvodini i zapažanja o mramorastom gundelju. (**The protection of young vineyards from cockchafer grubs.** [English summary 2 pp.]
Zasht. Bilja, 1956, No. 33, pp. 35-47, bibl. 8.

Of grubs of cockchafers attacking the roots of young vines in Vojvodina those of the marble cockchafer, *Polyphylla fullo*, are the most dangerous. The biology of the pest and injury caused are described. In control experiments good results were obtained with many BHC-containing proprietary insecticides worked into the soil to a depth of 30 cm. or applied in the planting holes.

323. Lupo, V.
Stato attuale della lotta contro la mosca della frutta (*Ceratitis capitata* Wied.). (**Present state of control of the fruit fly, *Ceratitis capitata*.**)
Not. Mal. Piante, 1956, Nos. 37-8, pp. 149-67, bibl. 26.

Attempts at biological control have met with little success in Italy. Results obtained in various countries from the use of poisoned baits and sugar sprays and of DDT, methoxychlor, ECE, dieldrin, parathion and Rogor (*p*-nitrophenyl-diethylthiophosphate) are discussed. Fumigation treatments of fruit prior to export are reviewed.

324. Santaolalla Azpilicueta, G.
Estudios sobre la biología y medios de lucha contra la *Cydia pomonella*. (**Studies on the biology and control of codling moth.**)
An. Inst. nac. Invest. agron. Madrid, 1955, **4**: 711-31, illus.

Apple trees were banded in June with corrugated cardboard to collect codling moth larvae and their various parasites. The insects were transferred in September to open-air breeding cages. Subsequent developments were recorded for several areas in Spain. In one study the bands were renewed every 10 days. Results were compared with those of the 3 previous years. Highly satisfactory control of codling moth was achieved by a single application of 0·25% DDT at the crucial date and similar results were obtained by 3 treatments with 0·3% lead arsenate at 10-day intervals. Defoliation by lead arsenate was probably connected with atmospheric humidity; it did not occur in dry areas even when the concentration was 0·5%. Reports that the general insecticidal efficiency of DDT favoured excessive mite increase were not confirmed. In general single treatments for control of codling moth were not effective, particularly if they followed, rather than preceded, the sharply defined peak of emergence of adults.

325. Thiem, E.
Untersuchungen zur Bekämpfung des Apfelwicklers (*Carpocapsa* [*Cydia, Laspeyresia*] *pomonella* L.). (**Studies on the control of codling moth.**)
NachrBl. dtsch. PflSchDienst, Berlin, 1956, **10**: 177-86, bibl. 37.

In East Germany control of codling moth on early varieties was satisfactory after 2 sprays, but 3 sprays were necessary for later varieties. Further increases in the number of spray applications did not appreciably improve control. Good control was obtained by DDT, DDT plus BHC (when DDT content was above 0·1%) and phosphoric acid ester materials. BHC cannot be recommended as it did not give satisfactory control and it affected fruit flavour. Sprays of DDT resulted in increased red spider populations.—Biol. Zentralanst., Berlin.

326. Baccolo, S.
Esperimenti di lotta con EPN (etil-paranitrofeniltiobenzenfosfato) contro *Cydia pomonella* L. e *Paratetranychus pilosus* Can. et Fanz. **(Experiments on control of *Cydia pomonella* and *Paratetranychus pilosus* with EPN (ethyl-paranitrophenylbenzenethiophosphonate).)**
Boll. Zool. agrar. Bachic., 1955, **21**: 253-7.

The action of EPN 300 (a wettable product containing 25% of active material), used at 120 g. per 100 l. of water 7 times at 18-day intervals or 5 times at 25-day intervals, was compared with that of 100 g. of parathion or of 700 g. of lead arsenate plus 60 c.c. of parathion in 100 l. of water applied 7 times at 18-day intervals. The proportion of pears infested by codling moth was 65% in the control, 14·6% with the longer and 13·2% with the shorter intervals of EPN treatment, 7·6% with parathion and 7% with lead arsenate plus parathion. No toxicity symptoms resulted from applying EPN. Red spider mites were completely controlled by both treatments with EPN, but neither of the other two treatments nor application of phosphoric esters gave satisfactory control of them.

327. Madsen, H. F.
Codling moth control on pears, 1954-55.
J. econ. Ent., 1956, **49**: 467-70, bibl. 7.

Tests started in 1954 to find substitutes for DDT in codling moth control on pears showed that Diazinon, ryania and methoxychlor were about equally effective and comparable with DDT. Diazinon also controlled spider mites, leaf miner and mealybug, while ryania was very effective against leaf miner. In 2 orchards where the occurrence of DDT resistance was reported faulty timing of the spraying appeared to be the cause of failure. During 1955 DDT and ryania were very satisfactory against codling moth, but Diazinon did not provide a commercial degree of control. Of the newer materials tested Stauffer 1303 (0,0-diethyl S-p-chlorophenylthiomethyl phosphorodithioate) showed considerable promise.—Univ. Calif., Berkeley.

328. Fenili, G. A.
Esperienze di lotta con arseniati e con prodotti di sintesi contro la *Cydia pomonella* L. **(Experiments with arsenates and synthetic products for control of codling moth.)**
Riv. Ortoflorofruttic. ital., 1956, **40**: 213-21.

The two treatments compared for apples and pears were (*a*) 6 applications at approximately fortnightly intervals of a 0·15% solution of a product containing 19·5% endrin, and (*b*) 2 applications with a 31-day interval of a 0·06% solution of a mixture of 0·4% lead arsenate and 20% phosphoric ester. The second treatment gave excellent control of both codling moth and aphids. Although endrin retained virtually full activity for 43 days, treatment (*a*) was not so satisfactory, probably owing to insufficient and uneven retention of the product by the growing fruits. It gave good control of *Aphis pomi* and *Yezabura piri*.

329. Pavićević, B.
Suzbijanje jabukinog smotavca nekim novijim insekticidima. **(Control of codling moth with some newer insecticides.)** [English summary 11 lines.]
Zasht. Bilja, 1956, No. 33, pp. 49-56, bibl. 10.

DDT-, BHC- and phosphorus-containing insecticides were compared with lead arsenate in 1954 and 1955 for control of codling moth on apples. With 0·75% lead arsenate very good results were obtained in both years. E 605f at 0·05% and 0·1% and Fosferno 20 at 0·1% were somewhat less effective, but Deenate (50% DDT, U.S. product) at 0·15% and DDT-50% at 0·2% were highly satisfactory.

330. Vespignani, A.
I moderni insetticidi alla prova contro la *Laspeyresia* (*Cydia*) *molesta* Busck. **(Modern insecticides tested against *Laspeyresia* (*Cydia*) *molesta*.)**
Frutticoltura, 1956, **18**: 369-81, bibl. 6, illus.

Excellent control of the oriental fruit moth on peach trees was achieved by spraying 3 or 4 times at 10- to 15-day intervals in July and August with a 0·7% mixture containing 40% of DDT and 10% of parathion. Results with parathion at 20 g. per hl. were promising and the effects of higher concentrations will be investigated. Diazinon, malathion and TEPP were less effective, but might be suitable for use shortly before harvesting.

331. Fukuda, J., and Okudai, S.
Studies on the effectiveness of parathion upon the important injurious insects of various fruit trees (additional report). [Japanese, with English summary ½ p.]
Spec. Rep. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1956, No. 3, pp. 71-81, bibl. 7.

Results with parathion for control of peach pyralid moth (*Dichocrocis punctiferalis*) and of oriental fruit moth (*Grapholitha molesta*) in a pear orchard are reported. Weekly applications of parathion from late May until about 10 days before harvest were very effective in controlling peach pyralid moth. The parathion residue per peach fruit one week after application was about 0·003 to 0·004 mg. Applications of parathion to a pear orchard for 2 years reduced infestation of oriental fruit moth to less than one-ninth of its previous level. [For earlier report see *H.A.*, 26: 1015.]

332. Wylie, W. D.
Trunk sprays for peach tree borer control.
J. econ. Ent., 1956, **49**: 574.

A single application of 3 pts per tree of a spray containing 6 lb. of 50% dieldrin w.p. in 100 gal. showed good promise for peach tree borer, *Sanninoidea exitiosa*, control in Arkansas.

333. Raucourt, M., Viel, G., and Ventura, E.
La lutte chimique contre les chenilles défeuillantes du pommier a cidre. **(Chemical control of caterpillars which defoliate cider-apple trees.)**
Ann. Épiphyt., 1956, **3**: 363-96, bibl. 18, illus.

xtensive tests were carried out for control of winter-oth and ermine-moth larvae, comparing the action of idane (a DDT product) as 5%, 8% and 12% powder, HC as 10% powder, a lead arsenate spray containing % arsenic and a bacterial product. The best results ere given by lead arsenate, but spraying was more stly than dusting. Zeidane was more effective than HC. The bacterial product was not effective. For inter moth the best application dates were between e last hatchings and pupation and for ermine moth etween the end of the leaf-mining phase and web rmation. For effective control the minimal leaf eposit of zeidane in a standard orchard was 1·5–2 kg. r ha. A motor dusting machine applying 50 kg. r ha. of a 5% zeidane powder gave almost complete ntrol of winter moth, whereas application by aircraft ecessitated 50 kg. per ha. of 10% zeidane, very calm eather and accurate release. Dairy cows should be cluded from treated orchards for 7 days after dusting.

34. Hikichi, A., and Hall, J. A.
Experiments on control of the strawberry leaf roller, *Ancylis comptana fragariae* (W. and R.), in Norfolk County, Ontario.
A.R. ent. Soc. Ont., 1955, **86**: 50-3, bibl. 1.

rathion gave satisfactory control of newly-hatched rvae of the strawberry leaf roller, and after treatment nner production was improved. Diazinon gave milar control but was more expensive. Parathion, iazinon and malathion-DDD gave complete control established larvae.

35. Okudai, S.
Studies on the resistance of chestnut varieties to the chestnut gall wasp (*Dryocosmus kuriphilus* Yasumatsu). 2. [Japanese, with English summary 1 p.]
Bull. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No. 3, pp. 85-94, bibl. 3, illus.

crotome sections showed that in resistant varieties larvae in the buds die at the same time as necrosis velops in the swollen bud tissue. [For Part I see A., 23: 1723.] J.R.L.

36. European and Mediterranean Plant Protection Organization.
***Aspidiotus perniciosus* Comst. San José scale in Europe and the Mediterranean basin in 1955.** [French and English.]
[*Publ.*] *Eur. Med. Plant Prot. Org.*, 1956, pp. IX and 9.

ief reports are given on the situation with regard San José scale and its control in Europe (Portugal, ain, Switzerland, Italy, Austria, Yugoslavia, France, Saar and Germany) and in Algeria. The pest s not been recorded in other European countries, in Tunisia, Israel, Egypt, Libya or Malta.

37. Michelbacher, A. E., and Hitchcock, S.
Calico scale on walnuts.
Calif. Agric., 1956, **10**(9): 6, illus.

an experimental walnut orchard a large over-ntering population of *Lecanium cerasorum* was ectively reduced by Audubon's warbler. Many of remaining scales were parasitized by *Blastothrix gipennis.*

338. Swift, J. E., and Madsen, H. F.
Thrips damage to apple.
J. econ. Ent., 1956, **49**: 398-9, bibl. 3, illus.

Fruit pitting on Golden and Red Delicious varieties was caused by the egg punctures of *Thrips madroni.* A pre-blossom spray of DDT gave fair control of the thrips, but treatments during petal fall and later were not effective.—Univ. Calif., Berkeley.

Spray materials and residues.

(*See also* 175, 244, 346b, z, 347j, 779, 838a, 904.)

339. Thomas, W. D. E.
The behaviour of systemic insecticides in plants: a survey of results obtained with ^{32}P-labelled schradan and demeton-S.
J. Sci. Food Agric., 1956, **7**: 565-73, bibl. 35.

In glasshouse experiments with schradan it was found that the 2 surfaces of broad bean and *Coleus* leaves were equally absorptive, but the lower surfaces of apple and chrysanthemum leaves were more absorptive than the upper surfaces. After root applications to broad beans in sand or soil, unchanged demeton-S was absorbed and detected in the shoot tip, where concentrations of demeton-S and its primary derivatives were present in amounts sufficient to kill *Aphis fabae.*—Long Ashton Res. Stat., Bristol. [See also *H.A.*, 26: 1632.]

340. Klinkowski, M.
Wirkungsspektra und Wirkungsmechanismen der Antibiotika. **(The spectra and mechanism of the effects induced by antibiotics.)**
Kongressber. Pflanzenschutzkongress, Berlin, 1955, Deutsche Akademie der Landwirtschaftswissenschaften Berlin, 1956, pp. 223-40, bibl. 55.

In this review the author cites instances of the use of different antibiotics as bactericides against *Pseudomonas phaseolicola, Ps. tabaci, Erwinia amylovora, Bacterium armeniaca*, as fungicides against *Aschochyta pisi, Helminthosporium papaveris, Podosphaera leucotricha*, their possible use to control viruses and insects; and for preserving vegetable material in store, e.g. spinach. He notes how they may favourably affect growth in vegetables such as radish, cucumbers, etc., and deepen the scent and colour in certain ornamental plants, but equally well, under certain circumstances, produce chlorophyll defects and changes in nuclear division in onion. He also discusses work on absorption and translocation and on the general mechanism of the action of antibiotics.

341. Somers, E., and Thomas, W. D. E.
Studies of spray deposits. II. The tenacity of copper fungicides on artificial and leaf surfaces.
J. Sci. Food Agric., 1956, **7**: 655-67, bibl. 18.

Some factors influencing the tenacity of spray deposits of copper sprays on various surfaces were studied. The relative importance of wind and rain in the weathering of deposits was determined in a field experiment with broad beans. Although rain was the more important weathering agent the effect of wind was considerable and seemed to be more prolonged.—Long Ashton Res. Stat. [For Part I, see *H.A.*, 26: 2671u.]

342. Sibilia, C.
Gli anticrittogamici acuprici in viticoltura.
(Non-cupric fungicides in viticulture.)
Not. Mal. Piante, 1956, Nos. 37-8, pp. 175-9.

Results of trials in Italy and France are discussed. Fermate (ferric dimethyl-dithiocarbamate) caused marked defoliation of vines and reduction of sugar content of must and was unsatisfactory in controlling downy mildew. The action of 0·4% Tulisan (tetramethylthiuramdisulphide) was even more adverse. Phthalimides and zinc thiocarbamates compared favourably with bordeaux mixture. Against powdery mildew the non-cupric compounds were ineffective, but sulphur products and karathane gave good results. The earlier leaf fall induced by non-cupric as compared with cupric fungicides is not considered important.

343. Neubert, A. M., and Carter, G. H.
A single sample method for foreign flavor detection.
Food Technol., 1955, **9**: 572-5, from abstr. in [*Publ.*] *U.S. Dep. Agric. WURB List 1*, p. 11.

Single samples of treated and untreated apples were tasted at random over adequately-spaced intervals. Off-flavours were detected in fruit of and juice from demeton-sprayed apples.

344. Clark, P. J., and Jacks, H.
The schradan content of fruit and vegetables.
N.Z. J. Sci. Tech., Sect. B, 1956, **38**: 58-65, bibl. 6.

The residual amounts of schradan were determined in treated crops including swedes, apples, strawberries, peas, beans, cabbages and carrots. There was a wide variation in the schradan content of swedes which had received similar spray treatments. Laboratory storage for 1 month after harvest did not reduce schradan residue. In the other crops appreciable amounts of schradan were found in the edible portions when less than 10 weeks had elapsed between spraying and harvesting.

345. Murphy Chemical Company.
Progress in low-volume spraying.
Comm. Gr, 1956, No. 3175, pp. 928-31.

Summaries are given of 9 papers presented at a conference in Bury St. Edmunds. These are: Low volume spraying: theory and experiment, by J. B. Byass; Low volume spraying and its development in England, by L. C. Pearch; The development of the Unimist nozzle for L.V. spraying, by G. Fletcher; Three years commercial experience with concentrates, by J. Roberts; Low volume fruit spraying in East Anglia, by B. D. A. Tucker; Essential features required in design of low volume orchard sprayers, by B. W. J. Wulff; Six years of the rotary atomizer in crop protection, by C. J. Rose; Growers' experiences with modern low volume machines, by D. Hunnam; and Toxicology of spray material, by N. K. Smith.

Noted.

346.

a Alyamova, V. A.
Is it possible to recommend dinitrorodanbenzol against downy mildew. [Russian.]
Vinodelie i Vinogradarstvo, 1956, No. 4, pp. 38-9, bibl. 1.
Not at present, owing to low residual activity.

b Anon.
Fitofarmaci e sapore dei vegetali. **(Off-flavours produced by plant-protection substances in vegetables and fruit.)**
Inf. fitopat., 1956, **6**: 270-1.

c Biological Branch, N.S.W. Department of Agriculture.
Sooty blotch and fly speck.
Agric. Gaz. N.S.W., 1956, **67**: 304-5, illus.
Gloeodes pomigena on apples and citrus and *Leptothyrium pomi* in apples and their control.

d van den Bruel, W. E., Moens, R., and Bollaerts, D.
Une nouvelle méthode de destruction applicable au rat musqué (*Ondatra zibethicus* L.): l'asphyxie des nichées par l'hydrogène phosphoré. **(A new method of musk-rat control: nest fumigation with hydrogen phosphide.)** [English summary ½ p.]
Parasitica, 1956, **12**: 87-114, bibl. 1, illus.

e Casilli, O.
Stato attuale della lotta contro la mosca delle ciliege (*Rhagoletis cerasi* L.) e prove dimostrative di lotta condotte in Puglia nel 1955. **(Present state of control of the cherry fruit fly (*Rhagoletis cerasi*) and demonstration control experiments carried out in Apulia in 1955.)**
Not. Mal. Piante, 1956, Nos. 37-8, pp. 235-9, bibl. 7.
Recent Italian work on control by DDT, parathion and mixtures of these.

f Chanasyk, V., and Stacey, E. C.
Windbreaks for the Peace River region.
Publ. Canada Dep. Agric. **973**, 1956, pp. 11, illus.
In the prairies.

g Clausen, C. P.
Biological control of insect pests in the continental United States.
Tech. Bull. U.S. Dep. Agric. **1139**, 1956, pp. 151, bibl. 152, map.
Biological control of fruit, field and garden insects.

h Collyer, E.
Notes on the biology of some predacious mites on fruit trees in south-eastern England.
Bull. ent. Res., 1956, **47**: 205-14, bibl. 22.

i FRIEDRICH, G.
Vorschläge zur Durchführung von Erhebungen über Frostschäden im Obstbau. **(Suggestions for carrying out surveys of frost damage in fruit growing.)**
Arch. Gartenb., 1956, **4**: 137-50.

j GILMER, R. M., AND BRASE, K. D.
The comparative value of various indexing hosts in detecting stone fruit viruses.
Plant Dis. Reptr, 1956, **40**: 767-70, bibl. 7, illus.

k GROSJEAN, J.
Jaarlijkse periodiciteit in de parasitaire activiteit van *Stereum purpureum.* **(Annual periodicity in the parasitic activity of *Stereum purpureum.*)** [English summary 1¼ pp.]
Tijdschr. PlZiekt., 1956, **62**: 226-35, bibl. 11.
The growth of the fungus was inhibited during the first summer after inoculation.

l GUPTA, S. L.
Occurrence of *Aspergillus carbonarius* (Bainier) Thom causing grape rot in India.
Sci. and Cult., 1956, **22**: 167-8, bibl. 4.
During transport and marketing.

m HORN, N. L., AND OTHERS.
The relation of nematodes to strawberry culture in Louisiana.
Plant Dis. Reptr, 1956, **40**: 790-7, bibl. 12, illus.

n HORSFALL, F., JR.
Pine mouse control with ground-sprayed endrin.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 68-73, bibl. 12.
2 lb. per acre of apple orchard. [See also *H.A.*, 26: 3570.]

o INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE.
La lutte chimique contre les hannetons et les vers blancs. **(Chemical control of cockchafers and their larvae.)**
Actual. agron. I.N.R.A., Sér. C, No. 1, 1954, pp. 159, bibls, illus.
A series of articles by various authors.

p DE JONG, D. J., AND VAN DE VRIE, M.
De bruikbaarheid van enige bestrijdingsmiddelen voor de bestrijding van een aantal fruitinsecten en het fruitspint. **(The effectiveness of control materials for the control of some fruit insects and red spider mite.)**
Fruitteelt, 1956, **46**: 602-3.
A table with notes.

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Les traitements insecticides et leur incidence secondaire sur la physiologie des plantes et des animaux. **(Insecticidal treatments and their secondary effects on plant and animal physiology.)**
J. Agric. trop. Bot. appl., 1956, **3**: 265-91, bibl. 99, illus.
Recent work on toxicity of insecticides to crops, animals and man is reviewed.

r LOUVET, J., AND DUMAS, M.
La désinfection des sols dans la lutte contre les maladies cryptogamiques. **(Soil disinfection in the control of cryptogamic diseases.)**
Ann. Soc. nat. Hort. Paris, 1956, **2**: 161-7, bibl. 16, illus.
A review.

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Lövvedboren—ett skadedjur på frammarsch. **(The shot-hole borer advancing [in Sweden].)**
Fruktodlaren, 1956, **27**: 128-31, 141, illus.
Anisandrus (*Xyleborus*) *dispar* and its control.

t MARSH, R. W.
Crop protection in Yugoslavia.
World Crops, 1956, **8**: 443-5; illus.
Organization and practice.

u MARTELLI, G.
Organizzazione attuale del servizio fitosanitario italiano e possibilità di difesa delle colture meridionali con speciale riguardo alla frutticoltura ed agrumicoltura. **(Present organization of the Italian plant-protection service and possibilities of crop protection in the south, with special reference to deciduous fruit and citrus cultivation.)**
Not. Mal. Piante, 1956, Nos. 37-8, pp. 181-97.

v MEZZETTI, A.
Efficacia dei chelati nella cura della clorosi ferrica. **(Effectiveness of chelates in curing iron chlorosis.)**
Inf. fitopat., 1956, **6**: 268-70, illus.
Examples of successful spray and injection treatments of peach, pear and vine with chelated iron compounds.

w MILAIRE, H.
Note sur le développement et le caractère des attaques de la mouche Méditerranéenne des fruits (*Ceratitis capitata* Wied) dans la Moyenne vallée du Rhône. **(A note on the development and character of attacks by the Mediterranean fruit fly in the middle Rhône Valley.)**
C.R. Acad. Agric. Fr., 1956, **42**: 504-8.

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Wasps.
Adv. Leafl. Minist. Agric. Lond. **451**, 1956, pp. 5, illus.

y MORETTINI, A.
Danni causati ai peschi dalle basse temperature verificatesi nel vogherese nell' inverno 1954 e 1956. **(Injuries caused to peach trees by low temperatures occurring in Voghera in the winters of 1954 and 1956.)**
Riv. Ortoflorofruttic. ital., 1956, **40**: 287-99, bibl. 2, illus.
Peach varieties cultivated in the district are grouped according to frost resistance.

z Mühlmann, R., and Tietz, H.
The chemical behaviour of methylisosystox in the living plant and the problem of residues.
Höfchen Briefe (English edition), 1956, **9**: 116-40, bibl. 11, illus.

347.

a National Tôkai-Kinki Agricultural Experiment Station.
Joint experiments on sodium pentachlorophenate (Chlon) as a dormant spray against fruit tree diseases. 1955. [Japanese.]
Spec. Rep. hort. Div. Tôkai-Kinki agric. Exp. Stat., 1956, No. 2, pp. 60, illus.

b Parent, B.
Quelques acariens et thrips prédateurs du tétranyque du pommier *Metatetranychus ulmi* (Koch), dans les vergers du Québec. **(Some mites and thrips predatory on fruit tree red spider mite in Quebec orchards.)**
Rep. Que. Soc. Prot. Plants 1954, 1956, pp. 44-60, bibl. 17, illus.
Seven mites and 4 thrips have been identified.

c Plock, H.
Der Befall von Apfelspalier-, Busch- und Spindelbuschbäumen durch den Pilz "Phytophthora cactorum". **(Infection by *Phytophthora cactorum* of espalier, bush and spindlebush apple trees.)** [English, French and Spanish summaries 2–3 lines each.]
Mitt. Klosterneuburg, Ser. B, 1956, **6**: 209-11, illus.
The varieties susceptible to *Phytophthora cactorum* in Germany are listed. Methods of prevention and treatment are outlined.

d Refatti, E.
La borocarenza delle pomacee nell'Italia settentrionale. Parte I. **(Boron deficiency of apples and pears in northern Italy. Part I.)** [English summary 7 lines.]
Ann. Sper. agrar., 1956, **10**: 1763-82, illus.
Cases of B deficiency with descriptions of symptoms, epidemiology, and cure.

e Ridpath, M. G., and Murton, R. K.
Bird damage—a biological problem.
Agric. Rev., 1956, **2**(5): 39-42.
Measuring and preventing damage, and bird destruction.

f Scaramuzzi, G.
Saggi colorimetrici per la diagnosi rapida di malattie da virus di fruttiferi. **(Colorimetric tests for rapid diagnosis of virus diseases of fruit trees.)** [English summary 5 lines.]
Ann. Sper. agrar., 1956, **10**: 1417-37, bibl. 10.

g Schmadlak, J.
Beobachtungen über die Frostempfindlichkeit von Süsskirschensorten im Winter 1954/55. **(Observations on the frost susceptibility of sweet cherry varieties in the winter of 1954/55.)**
Dtsch. Gartenb., 1956, **3**: 167-8, illus.
In Magdeburg-Ottersleben.

h Statens Forsøgsvirksomhed i Plantekultur.
Spindemider på frugttraeer. **(Spider mites of fruit trees.)**
Tidsskr. Planteavl, 1956, **60**: 365-8.
Biology and control of *Metatetranychus ulmi* and *Bryobia ribis*.

i Stearns, L. A.
Meadow spittlebug and peach gummosis.
J. econ. Ent., 1956, **49**: 382-5, bibl. 13, illus.
Extrusions of small droplets of gum from peach fruits have been caused by the meadow spittlebug (*Philaenus leucophthalmus*).

j Wolf, P. A.
Sodium orthophenylphenate (Dowicide A) combats microbiological losses of fruits and vegetables.
Down to Earth, 1956, **12**(2): 16-19, bibl. 27, illus.
A review on the use of sodium orthophenylphenate to prevent fungal spoilage of citrus fruits, apples, pears and some other crops.

WEEDS AND WEED CONTROL.

General.

(*See also* 383, 390c, j, 584, 997.)

348. Anon.
Report of the Research Committee of the Southern Weed Conference for 1956.
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 258-304.

This report lists agreements reached on certain treatments and problems requiring investigation. It is divided into sections on agronomic crops; horticultural crops; pastures, grasslands and turf; the control of specific weeds; brush; aquatic weeds; equipment, cultural practices and techniques; physiological and other effects of herbicides on plants; the comparative efficiency of new herbicides, behaviour of herbicides in soils and properties of herbicides.—*Weed Abstr.*, **5**, No. 1069.

349. Leefe, J. S.
Progress report on weed control investigations, 1955.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 58-60.

Notes are included on weed control in peas, onions, strawberries and asparagus. Tests indicated that dalapon at 10–15 lb./ac. is safe to use under mature apple trees and that at 10 lb./ac. +0·5 lb./ac. 2,4-D is safe under young apple seedlings. At 10 lb./ac.

dalapon caused injury to the foliage of peach trees.—From *Weed Abstr.*, **5**, No. 1179.

350. LeLacheur, K. E.
Weed control activities. Dominion Experimental Farm, Charlottetown, P.E.I.—1955.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 66-7.

Of 5 chemicals used in peas, dinoseb(amine) at 1·5 gal./50 gal./ac. applied pre-emergence gave very good control of weeds and the highest yield of peas (pods and shelled). In preliminary tests amino triazole at 4 lb./ac. gave good control of grasses in strawberries, but new (strawberry) growth showed severe chlorosis. Grasses and weeds were controlled in upland cranberries by a spring application of approximately 200 gal./ac. of Varsol.—From *Weed Abstr.*, **5**, No. 1182.

351. Collins, W. B., and Everett, C. F.
Summary report of the 1955 weed control investigations at the Experimental Farm, Fredericton, N.B.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 67-77.

Pre-emergence treatments were made in peas, beans and corn with dinoseb(amine), 2,4,5-TES, NPA, 2,3,6-TBA and CMU. Dinoseb gave the best weed control without causing crop damage. Other items dealt with in this report include weed control in field crops, control of some weed species, and inconclusive results on the use of 7 herbicides in strawberry.—From *Weed Abstr.*, **5**, No. 1183.

352. Bordfleau, R., and others.
Summary of weed control studies, 1955. Experimental Farm, L'Assomption, Quebec.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 81-6.

In this report the following investigations are of horticultural interest: *Quack grass* [*Agropyron repens*] *control in various crops:* In 15 crops which included tobacco, tomato, peas, carrots and table beets, amino triazole, MH(amine) and sodium 2,2,3-trichloropropionate showed good promise for quack grass control. *Weed control in strawberry plantations:* The chemicals used were 2,4-DES at 3 lb./ac. and 2,4-D (amine) at 8 oz./ac. Results indicated that all varieties could be planted immediately after 2,4-DES treatment without ill effects. The herbicide appeared to keep the ground free from weeds for a 3–4 week period, after which the cultivator was used. Observations were made on the effect on the strawberry plants of applications of 2,4-D at the pre-flowering and green fruit stages. In the first case (pre-flowering), the leaves and stolons were slightly deformed but after 3 days the plants were back to normal. There was no apparent damage following applications at the green fruit stage, but such treatment seemed unprofitable. *Chemical weed killers tested on onions:* Herbicides were applied pre- and post-emergence. The results indicated that IPC pre- and post-emergence, CMU pre-emergence and hydrin (a mixture of aromatic hydrocarbons) post-emergence were the most effective. The CMU plots remained free of weeds for a longer period than the IPC plots, but the former slightly retarded the growth of the crop. There are no yield records.—From *Weed Abstr.*, **5**, No. 1187.

353. Hay, J. R.
Translocation of herbicides in plants.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 22-8, bibl. 7.

A general paper on translocation with particular reference to 2,4-D. An account is given of experiments designed to estimate by extraction and bioassay the amounts of 2,4-D translocated following foliar applications to beans, and foliar and stem applications to *Dichrostachys nutans* [see also *H.A.*, 26: 3686]. 2,4,5-T was also used in experiments on the woody plant. Movement within the plant of other herbicides including arsenic compounds, sodium chlorate and CMU is also considered.—*Weed Abstr.*, **5**, No. 1169.

Control of aquatic weeds.

(*See also* 390a, e.)

354. Reed, L. R.
1955 field experiences with sodium arsenite for aquatic weed control.
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 245-9, bibl. 6.

A review of the present position concluding that, in spite of its drawbacks, sodium arsenite is still the best and cheapest chemical to use for the control of submerged aquatic weeds.—From *Weed Abstr.*, **5**, No. 1066.

355. McCambridge, J. R.
Chlorea for industrial and rights-of-way weed control and sodium arsenite for aquatic weed control.
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, pp. 63-9.

Chlorea (40% sodium chlorate, 57% sodium metaborate and 1% CMU), applied as a dust or a spray, is recommended as a soil sterilant at 1 to 3 lb. per 100 sq. ft. Sodium arsenite (containing 4 lb./gal. arsenic trioxide) is recommended for the control of submerged aquatic vegetation and floating algae. Rates and methods of application are suggested, and species against which the chemical is effective are listed.—From *Weed Abstr.*, **5**, No. 1387.

356. Fudge, O. L.
Irrigation problems and costs.
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, pp. 90-3.

A review of weed control methods and their costs and results in an intensively irrigated district. The programme incorporates several different methods: (1) burning, used primarily as a cleaning-up operation following the use of chemicals, (2) 2,4-D (sodium) for woody growth, (3) a combination of 2,4-D (sodium) and TCA for cattails [*Typha* spp.] and sedges [*Carex* spp.], (4) dalapon for *Phragmites* and the early spring grasses, e.g. wild oats [*Avena fatua*] and canary grass [*Phalaris canariensis*], (5) an emulsifiable aromatic oil used throughout the summer on bermuda grass [*Cynodon dactylon*] in areas where quick relief is needed. The primary method of controlling submerged waterweeds is by draining the canals for three days every four weeks, and where this is impossible by the use of aromatic solvents.—*Weed Abstr.*, **5**, No. 1400.

Weed control in fruit crops.

(*See also* 349-352.)

357. Neilson, J. J.
A brief report on weed control investigations at the Western Ontario Agricultural School, Ridgetown, Ontario, 1955.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 118-19.

Dalapon (50%) at 8 lb./ac. in 48 gal. applied in hot weather 10–14 days before ploughing gave practically 100% control of grasses and weeds in an old garden and of quack grass (*Agropyron repens*] in a fence row. It was also effective at 6 lb./ac. (formulated material) in 100 gal. on quack and other grasses round peach, plum, gooseberry, black and red currants, dwarf apple, grape and raspberry. Only raspberry was noticeably injured but new shoots sprang up. NPA post-emergence at 4 lb./ac. (formulated material) in 100 gal. gave very good control in muskmelons and watermelons, and post-emergence at 8 lb./ac. controlled weeds in cucumbers for 30 days.—From *Weed Abstr.*, **5**, No. 1199.

358. Palfrey, G. D.
1955 progress report on weed control investigations.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 61-6.

Weeds in low-bush blueberry fields: Amino triazole applied at 2 and 4 lb. a.e./ac. in 40 gal. was safe for blueberries. Of weeds present good control was obtained of 3 *Solidago* spp., and some promising results, worthy of further trials, were noted on *Spiraea*, *Rhodora* [*Rhododendrons* spp.?] and possibly blackberry. *Early trials with 2,4-D (amine) and MCPA on lamb kill* [*Kalmia angustifolia*] *in low-bush blueberries:* Damage was caused to both crop and weed, and it is suggested that application should be made in autumn rather than in spring. Sweet fern [*Myrica asplenifolia*] was effectively controlled in blueberries by an autumn application of 2,4-D at 1 lb./ac. in 5–10 gal. The report also deals with the control of various weed species without reference to crops.—From *Weed Abstr.*, **5**, No. 1181.

359. Fisher, J. R.
Weed control in grapes.
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, pp. 106-7.

Dalapon at 20 and 40 lb./ac. applied as a direct spray to bands 4 ft. wide has given good grass control in many varieties of grapes without any crop injury. Oils have also been successfully used in the same way. —*Weed Abstr.*, **5**, No. 1405.

Weed control in lawns.

(*See also* 390d, f, 710.)

360. Coulter, L. L., and Barrons, K. C.
Kuron for turf weed control.
Down to Earth, 1956, **12**(2): 24-5, illus.

In Michigan Kuron, an ester formulation of 2-(2,4,5-trichlorophenoxy) propionic acid [2,4,5-TP], at 1 qt/a. gave good control of mouse-ear chickweed (*Cerastium vulgatum*), white clover (*Trifolium repens*) and other weeds infesting lawns. The herbicide may be used safely on non-stoloniferous grasses including the blue grasses and fescues at rates not exceeding 1 and 1½ qt./a. Kuron should not be used on golf greens.

361. Klingman, G. C.
Wild garlic (*Allium vineale*) control in a Bermuda grass turf.
From abstr. in *Proc. 9th annu. Mtg south. Weed Conf., 1956*, p. 231.

Mowing to 1·5 in. every 2 weeks from mid-January to early May gave a reduction of only 34% after 3 years, and mowing every week only 52% in the third year. Mowing till early March followed by 2,4-D (amine) 1 lb./ac. gave 85% control after 3 years. Application of 2,4-D (amine) in March at 3 lb./ac. for 3 years gave 93% control at the end of that period. Application of 2,4-D (amine) at 1 lb./ac. in mid-January, February and March gave 98% control after 2 years. Four MH treatments gave 93% control after 2 years.—*Weed Abstr.*, **5**, No. 1061.

362. Tilgate Research Station.
A method for the assessment of moss infestation in turf.
Tech. Bull. Tilgate Res. Stat., **4**, 1956, pp. 2, bibl. 2.

The turf is divided into 1½-ft. squares, each of which is assessed separately for percentage of moss by reference to 8 diagrams. Black patches on these represent infestations ranging from 0·1% to 75%. The series of assessments is combined to give a mean for the whole area. The method has proved accurate.

363. Tilgate Research Station.
Experiments on the control of mosses in turf with calomel.
Tech. Bull. Tilgate Res. Stat., **5**, 1956, pp. 3, bibl. 3.

Preliminary experiments indicate that mosses can be controlled in turf by annual application of calomel at 0·3 g. per sq. yd, i.e. at about ¼ the rate previously used. A dispersible powder containing 50% calomel was applied.

Weed control in sub-tropical and tropical crops.

(*See also* 390i, 844.)

364. Day, B. E., Russell, R. C., and McCarty, C. D.
Monuron (CMU) for citrus weed control.
Calif. Citrogr., 1956, **41**: 426, 436-42, bibl. 3, illus.
Citrus Leaves, 1956, **36**(11): 6-7, 24-5, illus.

Information from experiments and growers' trials has been collected in this report on the use of CMU in citrus orchards. Autumn applications at a rate of 2 lb. per acre controlled germinating weeds until spring. Spring treatments of 2 lb. per acre remained effective throughout the summer except where irrigation was heavy. The best results were given by pre-emergence applications. In pot tests the application of a mulch of farmyard manure meant that higher CMU dosages

ere required. Dosages below 6 lb. per acre are con-
dered safe for young trees. Mature leaves on tree
irts were not affected by sprays of 5 lb./100 gal.
non-cultivated lemon orchards excellent control
weeds was obtained by autumn and spring applica-
ons at rates of 2 lb. per acre. Lemons were also
own to be tolerant of relatively high herbicide
pplications. In a comparative trial with lemons both
MU and DCMU gave excellent weed control, but
e return of weeds was rather earlier and denser in the
CMU-treated block.

365. Robinson, J. B. D.
Recent results of experiments with weed-killers in coffee.
Mon. Bull. Coffee Bd Kenya, 1956, **21**: 249-51, 254, bibl. 3.

CP and PCP+2,4-D treatments gave satisfactory
eed control in both mulched and unmulched coffee
ter-rows. Dowpon+2,4-D also gave satisfactory
eed control and was particularly promising for control
Digitaria scalarum. Preliminary tests showed that
pre-weed emergence spray of CMU at 2 or 4 lb. per
re gave effective control of normal weed growth
cept *Digitaria* for 8–10 weeks. CDAA and CDEA
2,4-D mixtures did not control *Cyperus* sp. or
gitaria, although annual grasses and broad-leaved
eds were controlled. CDEC+2,4-D gave some
gree of control of *Cyperus*. MH suppressed mixed
ed growth, but its effect wore off after 4 or 5 weeks.

366. Allen, H. P., and Smith, W. N.
Weedkiller trials on lalang in Malaya.
Outlook on Agric., 1956, **1**: 70-4, bibl. 1.

isfactory control of lalang was obtained 4 months
er application by CMU at 60 and 80 lb. per acre.
U at 80 lb. per acre was only successful after pre-
inary slashing. Six months after application
ellent control of lalang by STCA at 150 and 200 lb.
acre was still apparent. Sovacide PYD gave poor
ults. Slashing and hoeing slightly reduced the
ectiveness of STCA at 100 lb. per acre and above,
tended to increase the effect of CMU and PDU.
e efficiency of CMU was increased when it was
plied in diesel oil plus water. Pentachlorophenol
ghtly increased the efficiency of CMU and PDU.
e growth of seedling rubber, 9 months after applica-
n, was only affected by CMU and PDU at 80 lb.
acre, and by STCA at 150 and 200 lb. per acre.
o-year-old rubber had hardly been damaged by
IU or PDU up to 40 lb. per acre 9 months after
blication. Coconut palms inspected 10 months after
blication showed damage by CMU at 60 and 80 lb.
acre. Mature palms were injured by all rates of
CA applied 8 months previously.

367. Hanson, N. S.
Dalapon . . . for control of grasses on Hawaiian sugar cane lands.
Down to Earth, 1956, **12**(2): 2-5, illus.

dium dalapon either alone or combined with TCA
2,4-D has proved very effective in controlling
nicious grass weeds in sugar cane. Four applica-
ns of 2½ lb. active dalapon per acre or 2 applications
5 lb./a. were better than a single dose of 10 lb./a.,
1 low volume treatment was as satisfactory as high volume. Rain did not affect the result unless it fell within ½ hour of spraying.

368. Loupe, D. T.
Extension aspects of weed and grass control in sugarcane in Louisiana.
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 273-41.

Dalapon at 4 lb./ac. applied in early October or late November reduced the sucrose content of sugar cane by about 6–8% but increased yield of cane by about 6%.—*Weed Abstr.*, **5**, No. 1064.

369. Stamper, E. R.
Weed and grass control in sugarcane in Louisiana.
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 86-91.

Dalapon 2 lb./ac. pre-emergence+2 lb. post-emergence and 2,4,5-TP pre-emergence+dalapon 2 lb. post-emergence gave better control of Johnson grass (*Sorghum halepense*) seedlings than the standard treatment of TCA 4 lb./ac. pre-emergence+4 lb. post-emergence. Equally effective was 2,4-D 1 lb./ac. pre-emergence+dalapon 2 lb. post-emergence. Treatments which gave the best weed control also gave the highest yield of cane and 96° sugar per acre. Against mature Johnson grass dalapon at 9 lb./ac., giving 94·4% control, was the most effective of 9 treatments tested.—From *Weed Abstr.*, **5**, No. 1030.

370. Hauser, E. W., and Thompson, J. T.
Progress report on control of established Johnson grass with chemicals and cropping.
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 190-6, bibl. 3.

Two applications of dalapon, each at 5 lb./ac., appeared to be more effective than single applications of 10, 15 or 20 lb./ac. There was no marked difference between April and July applications to young, actively growing leaves. Sodium 2,2,3-trichloropropionate alone or with the addition of amino triazole was less effective than dalapon at equal rates. Applications in 35 gal./ac. water was adequate even when the weed was 5 ft. high; a wetter (Tergitol) was added at 0·5%.—*Weed Abstr.*, **5**, No. 1055.

371. Westrop, A. R.
Some preliminary notes on weed-killing in tea with sodium chlorate.
Nyasaland Fmr Forester, May 1956, reprinted in *Plant Chron.*, 1956, **51**: 407-9.

Mist spraying with 10% Atlacide (largely sodium chlorate) has successfully controlled weed growth in tea plantations throughout the plucking season. Hot sunny mornings appeared to provide the most suitable conditions for spraying.

Weed control in vegetables.

(*See also* 349-352, 390g, 466.)

372. Addy, S. K.
Preliminary experiments on the control of *Orobanche* on brinjal by "Crag" Herbicide 1.
Sci. and Cult., 1956, **22**: 231-2, bibl. 2.

In pot experiments the parasite was completely controlled by spraying the soil with 0·5% or 1% aqueous Crag Herbicide 1 and immediately irrigating, 2 weeks after transplanting inoculated eggplant seedlings. Without irrigation only one plant of the 6 tested was parasitized. Controls receiving irrigation but no herbicide were severely affected.—Agric. Res. Stat., Sambalpur, India.

373. Stevenson, E. E.
Control of morning-glory in lima beans and other crops.
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, p. 105.

2,4-D(amine) has been successfully used for the control of morning glory [*Convolvulus* spp.] in lima, red kidney, pink, blackeye and string beans, the crop being protected by shields (inverted troughs about 6 in. wide and 6–8 in. high).—*Weed Abstr.*, **5**, No. 1404.

374. Melville, G., Perkins, D., and Stamper, E. R.
The effect of several chemicals at various rates on horticultural crops for weed and grass control in Louisiana.
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 167-70.

Greenhouse and field tests indicated that amino triazole, dinoseb and 3,4-DDU are unlikely to be useful for selective weed control in cabbage and mustard. In the greenhouse 2,chloro-4,6-bis (diethylamino)-S-triazine [CDT] was promising, but not in the field. Shallots appeared to tolerate 3,4-DDU up to 1 lb./ac., dinoseb 2 lb./ac., amino triazole 2 lb./ac., CDT 4 lb./ac., and probably CIPC, but not TCA 10 lb./ac. Snap beans tolerated 3,4-DDU up to 0·5 lb./ac., dinoseb 6 lb., CIPC 6 lb. and amino triazole 6 lb.—*Weed Abstr.*, **5**, No. 1050.

375. Guzman, V. L.
Weed control in carrots with CIPC on organic soils.
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 175-8, bibl. 4.

The best pre-emergence weed control in carrots (variety Imperator) was obtained with 10 lb./ac. CIPC in water or 4 lb. in Stoddard solvent. Two post-emergence applications of 10 lb. CIPC (pellets) or one of 4 lb. CIPC in oil gave additional weed control with no reduction in yield. The residual effect of oil alone was negligible. Parsley appears to tolerate similar rates of CIPC in oil or water pre- and post-emergence.—*Weed Abstr.*, **5**, No. 1052.

376. Chappell, W. E.
Screening tests on peanuts, soybeans and castor beans in 1955.
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 57-60.

In castor beans the following herbicides were suitable for pre-emergence use: dinitro 6 and 9 lb./ac., PCP 20 lb./ac., 3,4-DDU 0·5 lb./ac. and NPA (sodium) 4 and 6 lb./ac.—From *Weed Abstr.*, **5**, No. 1025.

377. Moore, J. F.
Weed control in pickling cucumbers and effect of herbicides on the crop.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 468-72, bibl. 8.

N-1 naphthyl phthalamic acid at 4·5 lb. per acre consistently gave good weed control without injury to cucumber plants. Sodium isopropyl xanthate also gave good control without injury at rates of from 6·4 to 25·5 lb. per acre. An application rate of about 10 lb. of sodium isopropyl xanthate per acre is suggested for commercial use. The amine salt of dinitro-o-sec-butyl phenol gave good weed control without crop injury at 1·5 to 3 lb. per acre but is considered somewhat less safe than the two treatments previously mentioned. Cucumbers proved sensitive to 3-(p-chlorophenyl)-1,1 dimethylurea at rates as low as 0·5 lb. per acre. Lower rates were not tested. Different formulations of N-1 naphthyl phthalamic acid were compared but the differences were slight. [From author's summary.]—W. Wash. Exp. Stat., Puyallup.

378. Kabulov, D. T., and Junusov, S. Ju.
Chemical control of Egyptian broomrape. [Russian.]
Sad i Ogorod, 1956, No. 8, p. 28.

Broomrape on melon, watermelon and tomato was successfully controlled in Uzbekistan by a September application of 0·2% DNC. The crop plants on the treated plots developed faster and produced 12% higher yields than on the control plots.

379. Waywell, C. G.
Results of herbicidal treatments on onion plots.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 107-8.

CIPC at 3, 5 and 8 lb./ac., herbisan (bis(ethyl xanthic) disulphide) 2 and 4 lb./ac., herbisan 91 1 gal./ac., (1-chloropropyl-2) N(3-chlorophenyl) carbamate 4 and 8 lb./ac. were applied pre- and post-emergence to onion plots. In both cases weed infestation was too light to provide good results but there were indications that CIPC and bis(ethyl xanthic) disulphide might be promising. CIPC was particularly effective against purslane [*Portulaca oleracea*].—*Weed Abstr.*, **5**, No, 1197.

380. Jasmin, J. J., Ferguson, W., and Browne, F. S.
Weed control in onion, mint and celery.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 88-93, bibl. 2.

Onion: Among other treatments, CIPC at 6 lb./ac.+sodium isopropyl xanthate 12 lb./ac. and CIPC 6 lb./ac.+2% aero cyanate were applied pre- and post-emergence to onions to test their effect on yield. No ill effects were noted from the use of CIPC, and it is now recommended for weed control in onions at rates of 4–8 lb./ac., depending on soil type. *Mint:* Analyses of results showed that CMU 0·5 lb./ac., 2,4,5-TES 6 lb./ac. and 2,4-DES 2 lb./ac. gave the best crop yields, and that the best weed control was obtained with 2,4,5-TES at 12 lb./ac. *Celery:* No difference was found in response to a herbicidal oil between early and late varieties of celery. In all cases yields were reduced.—From *Weed Abstr.*, **5**, No. 1189.

381. Hammarlund, A., and Petersen, H. I.
Ukrudtsbekaempelse i aerter med dinoseb (dinitrobutylfenol) og M-hormon (4klor-2metylfenoxyeddikesyre). (**Weed control in peas with dinoseb and MCPA.**) [English summary 1 p.]
Tidsskr. Planteavl, 1956, **60**: 253-68, illus.

) Peas for drying: Where the number of weeds ceeded 100 per metre of row highest yield increases bout 14%) were obtained from a mixture of 3 l. noseb 20% and 0·25 kg. active substance MCPA r ha. With fewer weeds the same amount of dinoseb pplied by itself proved most beneficial (about 10% eld increase). (2) Green peas: Where the number of eeds exceeded 20 per metre of row highest yield creases (about 7%) resulted from an application of l. dinoseb plus 0·125 kg. active substance MCPA, gher dosages of the latter proving phytotoxic. In ese trials, which were carried out at the Danish Weed esearch Institute and at several of the State Research ations, the herbicides were applied when the peas had ached the height of 10–15 cm.

82. Laumeister, L. T.
Weed control in vegetable crops.
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, pp. 98-99.

opham may be applied to spinach at 4 lb./ac. when e crop has 2–4 true leaves. CMU at 1 lb./ac. has o been successfully used immediately after sowing. *Weed Abstr.*, **5**, No. 1402.

83. Liljedahl, J. B., Carleton, W. M., and Kinch, D. M.
Weed control in the row.
Agric. Engng St. Joseph, Mich., 1956, **37**: 550-2, 554, bibl. 8, illus.

possible methods for temporary sterilization of a p of soil for sowing sugar beet [and presumably er row crops] are considered, and experimental rk with the 3 most promising methods, i.e. mechani- energy [see also *H.A.*, 26: 3692], heat energy and asonic energy, is described.

Particular herbicides.

(*See also* 353, 390b, h.)

4. Berrie, G. M.
A guide to weedkillers.
Adv. Leafl. W. Scot. agric. Coll. **58**, 1956, pp. 4.

rt general notes on: sodium chlorate, arsenicals, A, sulphuric acid, DNOC, DNBP (dinoseb), PA, 2,4-D, MCPB, 2,4,5-T, mineral oils, CMU, P, potassium cyanate, MH and SES [2,4-DES].

5. Mull, H. M.
Chemical and physiological studies.
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, pp. 57-9.

eport based on 13 summaries and other communica- ns dealing with 2,4-D and amino triazole. Experi- nts with kidney beans have shown that adding tain chlorinated acids or unsubstituted carboxylic ds to amino triazole results in decreased chlorosis primary leaves but increased chlorosis of higher ves.—From *Weed Abstr.*, **5**, No. 1384.

6. Robinson, E. I., and Willard, C. J.
Ester *versus* amine formulation of 2,4-D applied pre-emergence.
Down to Earth, 1956, **12**(2): 11.

e propylene glycol butyl ether ester of 2,4-D was found to persist in the top 1 in. of soil to a much greater extent than the alkanolamine salt, making the former more satisfactory for pre-emergence weed control treatments.

387. Carlson, A. E.
Substituted urea herbicides.
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, pp. 30-4.

A review. A ring of CMU about 4 in. wide sprayed on the ground above the main part of the root system, at any time of the year, at approximately 0·25–0·125 oz. per tree killed many woody species.—From *Weed Abstr.*, **5**, No. 1376.

388. Appleton, A. A.
Substituted urea herbicides for agricultural use. A progress report.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 134-9.

Results are given of a number of experiments from various stations using CMU, PDU and 3,4-DDU on many crops and weeds. Of horticultural interest is the use of CMU in mint, peas, turnips, carrots, beans, tulips, daffodils, Wedgewood iris and gladioli. In conclusion it is stated that CMU may be applied to asparagus more than 1-year-old at rates up to 4 lb./ac., and that peas, mint, carrots and beans should tolerate up to 1 lb./ac., and daffodils, gladioli, tulips and Wedgewood irises up to 4 lb./ac.—From *Weed Abstr.*, **5**, No. 1204.

389. Warren, J. C. R., and Fuller, J. C. E.
Experimental herbicide 3Y9.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 139-41.

An account is given of limited field trials, during one season only, with 3Y9 (tris(2,4-dichlorophenoxyethyl) phosphite). The material applied pre-emergence at 2–8 lb. active ingredient per acre is reported to kill many grassy and broad-leaf weeds. Data so far obtained indicate that weed control with 3Y9 is not only superior to that of comparable pre-emergence herbicides but the residual action is much greater. When used at 2 lb./ac. in asparagus weed control equal to that with CMU was obtained.—From *Weed Abstr.*, **5**, No. 1205.

Noted.

390.

a Arle, H. F.
Aquatic weeds: submersed and emergent.
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, pp. 56-7.
A report based on 8 abstracts from 5 contributors.—From *Weed Abstr.*, **5**, No. 1383.

b Beatty, R. H.
Progress report on 3-amino 1,2,4-triazole (Amizol).
Joint Proc. 8th annu. Calif. Weed Conf. and 15th west. Weed Control Conf., 1956, pp. 61-3.
Against grassy-, broadleaf- and aquatic weeds and woody species.—From *Weed Abstr.*, **5**, No. 1386.

c CRAFTS, A. S.
Weed control: applied botany.
Amer. J. Bot., 1956, **43**: 548-56, bibl. 37.
Major weeds and herbicides; a review.

d DANIEL, W. H.
Control of crab grass in the Midwest.
Amer. Nurserym., 1956, **103**(10): 24-30.
In lawns, by cultural practices and treatment with phenyl mercury acetate, potassium cyanate or disodium methyl arsenate.

e DISEKER, E. G.
Destroy weeds in drainage ditches.
Res. and Fmg N.C., 1956, **15**(Progr. Rep. No. 1): 15.
Especially with 2,4-D.

f NYLUND, R. E., AND STADTHERR, R.
Studies on the control of crabgrass in bluegrass lawns.
Weeds, N. York, 1956, **4**: 264-74, bibl. 30.
See *H.A.*, 26: 3627.

g PEABODY, D. V., JR., AND WOLFE, H. H.
Weed control in green peas for Western Washington.
Ext. Misc. Publ. St. Coll. Wash. Ext. Serv. **15** (revised 1956), pp. 2.
Dinitro amine is the only chemical now recommended.

h RADEMACHER, B.
Der Stand der Herbizidforschung. **(Herbicide investigations, the present position.)**
Kongressber. Pflanzenschutzkongress, Berlin, 1955, Deutsche Akademie der Landwirtschaftswissenchaften, Berlin, 1956, pp. 197-222, bibl. 44.
An examination of the aims and uses of different herbicides.

i STAMPER, E. R., AND MELVILLE, G.
Studies in the control of nutgrass (*Cyperus rotundus*).
Proc. 9th annu. Mtg south. Weed Conf., 1956, pp. 220-4, bibl. 4.

j WIANKO, M. R.
Test of chemicals for couch grass control.
Proc. 9th Mtg east. Sect. nat. Weed Cttee 1955, Truro, N.S., 1956, pp. 96-102.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 3, 4, 25, 36, 44, 45, 55-57, 62, 66m, n, 181g, y, 388, 576z, 577e, 797, 845, 955, 964, 974, 982, 985-987, 994, 1003a, b.)

391. THÉVENIN, L.
Introduction de plantes. **(Introduction of plants.)**
Rapp. Serv. bot. agron. Tunis, 1955, 1956, pp. 130-4.

Results of introduction into Tunisia of certain varieties of pea, cabbage, cauliflower, capsicum, lettuce and eggplant are briefly reported.

392. PLAVŠIĆ-GOJKOVIĆ, N.
O poljoprivredi otoka Murtera s naročitim osvrtom na Betinsko-Murtersko polje. **(Review of the agriculture of Murter island with special reference to the Betina-Murter region.)** [French summary $\frac{1}{3}$ p.]
Bilj. Proizv., 1956, **9**: 101-9, bibl. 9, illus.

The chief crops are early vegetables, figs and olives. Plans for improving and extending market gardening are discussed.

393. DE VILMORIN, R. L.
The improvement of strains of vegetables.
J. roy. hort. Soc., 1956, **81**: 338-46, 386-95.

The history of vegetable growing in the world is discussed and modern methods of breeding vegetable varieties are described.

394. BREMER, A. H.
Planteforedling i norsk grønnsakdyrking. Norsk foredling av grønsakvokstrar. **(The improvement of Norwegian vegetable varieties.)**
Gartneryrket, 1956, **46**: 586-9, illus., and 611-12, bibl. 20.

The first article traces the gradual improvement o Norwegian vegetable varieties over the past decades the second discusses the desirability of establishing central institute for the breeding and selection of vegetable varieties in Norway.

395. AMERICAN SOCIETY FOR HORTICULTURE SCIENCE, COMMITTEE ON VEGETABLE BREEDING AND VARIETIES.
New vegetable varieties. List III.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 587-609.

This list covers American vegetable varieties introduce during the period 1936-1956, and the following information is given about each: date of introduction origin, parentage, varieties it most closely resembles main characteristics including disease resistance, an original adaptation.

396. ODLAND, M. L., AND NOLL, C. J.
1955 vegetable variety trials.
Progr. Rep. Pa agric. Exp. Stat. **149**, 1956, pp. 11.

Lima and snap beans, beetroot, summer squash carrot, eggplant, tomato, pea, celery and cucumbe varieties and strains are reported on.

397. SOMOS, A.
Az öntözéses zöldségtermesztés irányelvei. **(Principles of irrigation in vegetable production.)**
Magyar tud. Akad. Agrartud. Oszt. Közl., 1955, No. 1-2, pp. 143-61, from abstr. in *Hung. agric. Rev.*, 1956, **5**(1): 7.

The 500–600 mm. average yearly rainfall in Hungary i insufficient for vegetables with a high water requirement such as pepper and cabbage. Vegetable growin under irrigation is discussed with regard to choice c suitable preceding crop, date of irrigation, amount c plication and the water economy of pepper, tomato d cabbage. The best preceding crops for winter bbage were lettuce, onion, radish, kohlrabi and early tato. For pepper and tomato preceding crops ich are harvested early, such as radish and spinach, re found to be the most suitable. Dates and rates individual applications are considered. The total igation water requirement of pepper was found to be 0 to 490 mm., that of late cabbage 320 to 560 mm., at of early cabbage 240 to 420 mm., and that of mato 150 to 200 mm. [See also *H.A.*, 26: 561.]

98. Long, W. G., Wittwer, S. H., and Tukey, H. B.
Growth and accumulation of radioactivity in plants grown on "fission fall out" contaminated soil.
Atomic Energy Commission Unclass. **3039**, 1955, from abstr. in *Quart. Bull. Mich. agric. Exp. Stat.*, 1956, **39**: 188.

an, corn and radish plants were grown in cultures of: sand plus 0·5 Hoagland's solution; (2) fission conminated soil; (3) fission contaminated soil plus 0·5 agland's solution; and (4) fission contaminated soil s full Hoagland's solution. Two weeks after ergence, symptoms typical of strontium toxicity peared. The severity depended upon the fertility el and the crop. Plants were harvested after 15, 30 d 45 days of growth, and the various organs were yed for radioactivity. Leaves were highest in tivity, except for the roots and fleshy hypocotyls of radish plants. Plants of the 3 species were generally wer in radioactivity when grown on fission conminated soil to which some supplemental nutrients e added. Further additions of nutrients to the taminated soil resulted in a higher up-take of ion products by the plants.

99. Leman, V. M.
Luminescent lamps as a source of irradiation for the culture of plants under glass. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 45-59, bibl. 18, illus.

e effects of illumination by luminescent and incancent lamps were compared on wheat, tomato, bean, tuce, radish and some woody plants. It was found supplementary illumination by luminescent lamps oduced sturdier plants with more leaves and better t systems, giving higher yields, than illumination by andescent lamps. Results obtained with runner ns and tomatoes are discussed in greater detail and owed that neon lamps were also satisfactory for se crops.

00. Artem'ev, G. V.
Vegetable culture under electric light in the Arctic. [Russian.]
Priroda, 1956, **45**(9): 100-2, illus.

r raising tomato and cucumber seedlings luminescent nps were generally found more suitable than incancent lamps and, in spite of higher installation costs, re economical. Tomato seedlings raised under minescent lamp BS-600, placed for a short time, just ore flower bud formation, under incandescent np LN-1,500, and then returned to the original light, duced twice as heavy yields as those remaining under lamp BS-600 throughout. Seedlings which were retained under the incandescent light for a prolonged period gave reduced yields. For growing both crops with supplementary illumination during the winter the use of incandescent lamps is recommended.

401. Moškov, B. S.
The use by plants of radiant energy provided from artificial sources. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 28-44, illus.

A series of experiments is described in which the effects of varying the intensity, spectral composition and direction of artificial light and also of temperature on the growth of wheat, tomato and cucumber were studied. In both tomato and cucumber seedlings the maximum production of plant material per unit of energy (W./mg.) occurred under conditions of weak illumination (150W./sq. m.) and high temperature (25° C.), but this did not result in the best plants.

402. Klešnin, A. F.
The importance of the spectral composition of physiologically active radiation on the growth and development of plants. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 17-27, bibl. 14, illus.

In the experiments described the effects of the spectral composition and intensity of light were studied on cucumber, turnip, lettuce, radish, onion, kohlrabi and Chinese aster. As source of light blue, green and red luminescent lamps were used with spectral regions around 480 mμ., 520 mμ. and 630 mμ. respectively. Plant responses expressed in fresh and dry weights, number of leaves, leaf area, time of bud formation and flowering are photographically and graphically recorded.

403. Česnokov, V. A.
The effect of CO_2 concentration on photosynthesis and yield. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 81-90.

The photosynthetic activity of outdoor tomatoes, cucumbers and some other plants was much higher than that of those grown in the glasshouse. Increasing the CO_2 content of the glasshouse air increased photosynthesis in many plants, but use of supplementary CO_2 to improve yields is considered to be suitable only for cucumbers and beans. The correct amounts of CO_2 can increase the yields of these 2 crops by 20–40%. CO_2 nutrition of tomatoes is stated to be less effective.

404. Perkins, H. J., and Aronoff, S.
Identification of the blue-fluorescent compounds in boron-deficient plants.
Arch. Biochem. Biophys., 1956, **64**: 506-7, bibl. 2.

The blue fluorescence observed by Spurr [*H.A.*, 23: 726) in the necrotic areas of B-deficient celery leaves has also been found in and around the necrotic areas on leaves of B-deficient tomato, lettuce, radish and sunflower plants. It is demonstrated that the fluorescence is due to the presence of chlorogenic and caffeic acids.—Inst. atomic Res. and Bot. Dep., Ia St. Coll., Ames.

405. Flocker, W. J., and Fuller, W. H.
Availability of calcium in calcareous soils.
Proc. Soil Sci. Soc. Amer., 1956, **20**: 387-91, bibl. 18.

Lettuce, radish and tomato were among the test crops when 5% of $CaCO_3$ was added to a calcareous soil, using Sr^{89} as a marker. Uptake of Sr was slightly reduced in lettuce and tomato, but unchanged in radish, by the addition of $CaCO_3$. Since plants apparently do not discriminate between Ca and Sr ions, this indicated the low availability of added $CaCO_3$. [See also *H.A.*, 26: 3290.]

406. Witte, K.
Frostschutz von Jungpflanzen unter Niederglas. **(Frost protection of young plants under low glass.)**
Reprinted from *Zbl. dtsch. Erwerbsgartenb.*, 1956, **8**(28), pp. 3, illus.

Young plants of kohlrabi, pelargonium, salvia and tomatoes in a double-span cold frame were protected from frost by all-night sprinkler irrigation over the glass. Covering the frames with mats also gave satisfactory protection but costs were higher.

407. Wilson, J. D., and Black, D. T.
Chemicals help control muck soil infestation of root-knot nematodes.
Ohio Fm Home Res., 1956, **41**: 40-2, illus.

Preliminary trials suggest that in highly organic soils root-knot nematode (*Meloidogyne hapla*) infestations can be partially reduced by applying 10–12 gal. EDB or 40–45 gal. D-D per acre with a chisel applicator to a depth of 8–10 ins. in the autumn when temperatures are above 55° F. and soil moisture would be at the optimum for plant growth. The percentage of infested carrot roots was reduced from 66 to 6 by EDB and to 21 by D-D. The infestations on celery were reduced by 90% with D-D and 98% with EDB. Onions do not grow well in soil which has been treated with EDB. [See also *H.A.*, 26: 2756.] J.R.L.

408. Roll-Hansen, J.
Beising av grønnsakfrø. Forsøk i årene 1944–54. **(The disinfection of vegetable seed. Trials 1944-54.)** [English summary 13 pp.]
Meld. Stat. Plantevern **10**, 1956, pp. 69, illus.

Beans: In Norway *Ascochyta hortensis* is as often responsible for fungal infection of plants and seeds as is *Colletotrichum lindemuthianum* (anthracnose). Yields from disease-free seeds per 1,000 square m. were 1,281 kg. as compared with 794 kg. from seeds with large fungal blotches, yields from seeds with small blotches being intermediate. Seed treatment with a variety of compounds greatly improved emergence in the field, but it failed to affect yields. Four field applications of copper fungicides failed to ensure disease-free seed. The author concludes that a wet climate is unsuitable for producing clean bean seed. *Peas:* Figures are tabulated for the emergence in the laboratory and in the field of sugar pod and marrowfat pea seed treated with several disinfectants. The quinone preparations Phygon and Spergon, especially the former, proved very effective against *Ascochyta pisi* infection, but the success of the treatment varied in different years. *Carrots:* Wet Ceresan and Phygon XL effectively controlled damping-off caused by *Stemphylium radicinum*. *Brassicas:* In steamed soil the disinfection of kale, cabbage and brussels sprouts seed reduced damping-off (*Phoma lingam* and *Alternaria brassicicola*) by about 50%, but the treatment remained ineffective in unsteamed soil where *Rhizoctonia solani* was the chief cause of the trouble. *Beetroot:* Best results were obtained from mercurial compounds. *Spinach:* Seed treatment (wet Ceresan and Phygon XL) greatly improved emergence in unsteamed soil, while in steamed soil, where emergence was good anyhow, some control of damping-off (*Colletotrichum spinaciae*) was achieved.—In conclusion it is stated that the production of healthy seed in suitable areas is preferable to the chemical control of seed-borne diseases.

409. Teakle, D. S.
Control of damping-off in seedbeds.
Qd agric. J., 1956, **82**: 215-16.

Seedbed management and heat treatments to reduce damping-off caused by *Pythium* spp. and *Rhizoctonia solani* are discussed. In addition the soil may be fumigated with formalin (2% at 2 gals. per sq. yd.) or methyl bromide (1 lb. for 50 sq. ft.). Care must be taken not to re-contaminate sterilized or fumigated soil, for heavier losses may then result. The seeds may be treated with thiram, chloranil or captan. Thiram, against *Pythium* spp., or captan against *R. solani*, may be used as soil drenches on growing seedlings. J.R.L.

410. Kaszonyi, S.
Palánták rizoktóniás szártőrothadása elleni védekezés "Fuklasin F" -fel. **(Control of damping off by Fuklasin F.)** [Russian and English summaries $1\frac{1}{2}$ pp. each.]
Növénytermelés, 1956, **5**: 77-86, bibl. 10, illus.

Damping off of seedlings and cuttings of economic and ornamental plants in Hungary is most frequently caused by *Rhizoctonia solani*. In control experiments tomato, capsicum and cabbage plants were grown in infected soil. When Fuklasin F was mixed with the soil growth of *Rhizoctonia* was impeded, so that percentage seed germination was increased. Germination was delayed by 3 or 4 days after Fuklasin F treatment. At a rate of 160–200 g./m^2. Fuklasin F initially impeded leaf growth, but stimulated root development to some extent. The action of Fuklasin F is fungistatic rather than fungicidal and after the chemical is leached out the fungus will start growing again.—Univ. Hort. and Vitic., Budapest.

411. Foster, A. C., and others.
Some effects of insecticide spray accumulations in soil on crop plants.
Tech. Bull. U.S. Dep. Agric. **1149**, 1956, pp. 36, bibl. 3.

Chemical analysis and taste evaluations were carried out over 7 years on snap beans, garden peas, carrots radishes, turnips and spinach, grown in cold frames and in the open, to see whether aldrin, dieldrin, isodrin endrin, heptachlor, chlordane, Dilan, BHC and toxaphene would accumulate in the soil and affect crops adversely. The tendency for an insecticide to accumulate appears to be much greater in some soils than i hers. Isodrin and endrin appear more likely to cumulate than aldrin, chlordane or heptachlor. oxaphene may accumulate to an extent only slightly ss than DDT; it is more stable than BHC, lindane or lordane and is normally used at higher rates. BHC eparations containing large quantities of isomers her than the gamma isomer may accumulate suffi- ently to impair the growth of sensitive crops, but ndane properly used does not appear likely to have is effect. J.R.L.

412. ANON.
Longer life for wood boxes.
Amer. Veg. Gr, 1956, **4**(8): 21.

ipping field boxes in Cellu-san, which contains a non- xic fungicide and a water repellent, protects them ainst rotting and mould growth and reduces repair sts.

Asparagus.

(*See also* 389, 577n.)

413. ELLISON, J. H.
Survey charts course of asparagus research.
N.J. Agric., 1956, **38**(2): 13-16, illus.

oot pest surveys were carried out in 37 problem paragus fields in New Jersey. Black root caused by *pfia rhizophila* was found to be very prevalent. or root systems and decayed red rootlets were sociated with low yields. Several genera of parasitic matodes were found, but numbers were not suffi- ntly high to affect production.

414. PERROT, —. (POIDEVIN, —, AND ROBERT, —.)
Note sur les essais de diverses périodes de production de l'asperge aux Béni-Amir.
(Note on trials involving different production periods of asparagus in Beni-Amir.)
Terre maroc., 1956, **30**: 327-8.

introduction of asparagus cultivation in this gated area of Morocco has given promising results two harvests a year are possible.

415. BRASHER, E. P.
Effects of spring, summer and fall cuttings of asparagus on yield and spear weight.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 377-83, bibl. 4.

studies over 10 years in Delaware, where the growing son extends from about April 15 to Oct. 15, paragus was subjected to cutting for 8 weeks at different periods, namely spring, summer, autumn ter first killing the tops either with a herbicide or by king) and spring plus autumn (4 weeks each). ing harvesting produced significantly higher yields n the other treatments, mainly owing to an increase the number of cuttings. Restricting harvesting to summer or autumn proved unsatisfactory, but from economic standpoint the spring plus autumn har- iting was promising. In the autumn-harvested plots ing the tops with a contact herbicide showed no vantage over disking. The spring and spring- umn harvests had no permanent effect on carbo- drate reserves in the crowns, but the summer harvest iously weakened the plants.—Univ. Del., Newark.

416. ELLISON, J. H.
Asparagus dieback.
Market Grs' J., 1956, **85**(8): 6-7, illus.

Dieback was prevalent in the north-eastern U.S.A. in 1953. Although the first flush in July was healthy, the second flush, coming in August, nearly all wilted and died. Studies showed that the trouble was not caused by calcium or boron deficiency, the symptoms of which are somewhat similar, but that it was due to water shortage. When the woody mature brush was cut down in August, thus removing competition for water, the young shoots of the second flush made healthy growth.—Rutgers Univ.

417. DITMAN, L. P., WILEY, R. C., AND GIANG, P. A.
Residues and flavors of asparagus treated with malathion.
J. econ. Ent., 1956, **49**: 422, bibl. 2.

The immediate residue deposits on asparagus resulting from malathion sprays were below the present tolerance of 8 p.p.m., and no malathion could be detected on fresh asparagus 3 days after treatment. All malathion was removed in processing both canned and frozen spears. No objectionable off-flavours were observed.

Brassicas.

(*See also* 374, 397, 576e, h, k, o, q, x, 577d, k, r, 779, 969.)

418. SAVČENKO, N. A.
Increasing the vigour of white cabbage. [Russian.]
Agrobiologija, 1956, No. 3, pp. 23-7.

In the south-east of the Ukraine late cabbage yields are limited by the hot dry summers in spite of irrigation. Experiments started in 1940 with the variety Zavodskaja showed that considerably increased yields and improved quality were obtained by developing different ecological strains of selected mother plants and allowing these to cross-pollinate freely in the field.

419. HONMA, S.
Effects of growing medium on the performance of transplants of four varieties each of cabbage and tomato.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 361-4, bibl. 6.

Seedlings of 4 cabbage and 4 tomato varieties were raised in 2 media, namely coarse sand supplied with a nutrient solution and ordinary potting soil, and were then planted in the field. Total yields were not affected by the medium, although with tomatoes the soil-raised seedlings gave higher early yields. The sand-grown seedlings were easier to transplant.—Univ. Neb., Lincoln.

420. RATVIK, H., ØSTEBY, A., AND NARVESTAD, K.
Rasjonaliseringsundersøkelse av plantearbeidet ved håndplanting av kål og selleri.
(Time and motion studies in the planting by hand of cabbage and celeriac.) [English summary $3\frac{1}{2}$ pp.]
Forskn. Landbruk., 1956, **7**: 369-416, illus.

Two new planting tools were used in these experiments: a dibble with a horizontal grip and another tool consisting of a curved, pointed blade with a horizontal handle, not unlike a pickaxe in miniature. In the study of planting cabbage and celeriac by hand attention is paid to small details of the operation. Photographic strips illustrate the methods compared for readers unable to read Norwegian.—Inst. agric. Econ. Fm Management, Agric. Coll. Norway. [See also *H.A.*, 25: 543.]

421. Somos, A.
A tenyészterület hatása a korai fejes káposzta hozamára és minőségére. **(The effect of spacing on the yield and quality of early cabbage.)** [Russian and German summaries 1 p. each.]
Agrártud. Egy., 1954 (issued 1956), **18** (2, part 1): 3-20, bibl. 5.

During a 3-years' trial the optimum spacing for the early cabbage variety Aranyföld [Golden Earth] was at 40 cm. apart in twin rows 45+25 cm. apart, and that for the variety Enkhuizen diadala [Enckhuisen's Triumph] 60 cm. apart in twin rows 45+25 cm. apart. At these and other spacings the twin row system of planting produced higher yields than single rows at the same spacings. Wider spacing resulted in better growth and more rapid development than closer spacing, irrespective of the system of planting, but the average weight of heads was greater in the twin rows.

422. Cooper, H. P., and Hall, E. E.
Significance of the coequal effect or balanced-baulic-poundage ratio of major fertilizer nutrients to relative percentage growth response in crop plants.
Soil Sci., 1956, **82**: 201-16, bibl. 31.

Combined results from analysis of 5 succulent vegetables gave a ratio of 3·2 : 1 : 3·4 for N : P_2O_5 : K_2O content. This, compared with the theoretical balanced ratio of 5 : 1 : 1·7, indicated relative deficiency of N and excess of P_2O_5. Mineral composition figures are given for cabbage, collard, broccoli and bean plants grown in Florida, showing the same type of disbalance of major nutrients.—S. Carolina agric. Exp. Stat.

423. Yamasaki, K.
Thermo-stage for the green plant of Chinese cabbage grown in spring. [Japanese, with English summary 1 p.]
Bull. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No. 3, pp. 31-47, bibl. 19, illus.

From investigations into flower bud differentiation and bolting in the Chinese cabbage variety Nozaki Harumaki No. 1 it is concluded that the lower the temperature, and the longer the duration of the low temperature, the earlier does flower bud differentiation occur. No differentiation occurs above 13° C. For normal heading 25 outer and 25 inner leaves are needed. When seedlings under a month old are transplanted from the hot bed to the field they develop flower buds before the formation of the 40th node after one week at 5° C. or 2 weeks at 10° C. and thus tend to bolt.
J.R.L.

424. Eguchi, T., and others.
Studies on seed production in cabbage (*Brassica oleracea* L.). Parts 1-4. [Japanese, with English summaries 2 pp.]
Bull. nat. Inst. agric. Sci. Hiratsuka, Ser. E, 1955, No. 4, pp. 217-64, bibl. 61, illus.

Part 1. On the differentiation and development of terminal flower buds in cabbage. From 3 years' experiments it has been found that the time of flower bud differentiation in cabbage varies with the time of sowing and with the variety, and that some varieties need a temperature as low as 0° C. *Part 2. On the differentiation and development of axillary flower buds in cabbage.* The differentiation of lateral flower buds followed that of the terminal buds, most being differentiated in March irrespective of time of sowing. More buds were formed on plants sown early in the summer than on those sown later, but these latter had a higher percentage of fruiting buds and were therefore more useful for seed production. *Part 3. Tests on the quantity of seeds produced by cabbage varieties sown at different times.* To produce maximum quantities of seed different varieties need to be sown at different times. The young plants from late sowings overwinter better and produce more seed than the older plants from earlier sowings. *Part 4. Influence of nitrogenous fertilizers applied at different dates on the yield and quality of seeds in cabbage.* The application of nitrogenous fertilizers at the pre-bolting stage increased the number of secondary lateral branches and flowers and increased the seed yield. J.R.L.

425. Simard, J.
Essais répressifs contre la jaunisse du chou. **(Tests on repressing cabbage yellows.)**
Rep. Que. Soc. Prot. Plants 1954, 1956, pp. 93-4.

Varietal resistance to *Fusarium oxysporum* f. *conglutinans* was studied: a genetical and an environmental type of resistance was apparent. Marion Market and Resistant Detroit possess genetical resistance to infection.

426. Coulson, J. G., Pelletier, R-L., and Simard, J.
Control of cabbage yellows with chemotherapeutants.
Rep. Que. Soc. Prot. Plants 1954, 1956, pp. 61-6, bibl. 8, illus.

Cabbage plants received chemotherapeutants for 4 days before inoculation with *Fusarium oxysporum* f. *conglutinans*. Plants treated with benzoic acid, phenyl mercuric acetate and hydroquinone showed much less severe symptoms than did control plants, and growth was unaffected.

427. de Dios, V. Y.
Tests of some insecticidal sprays in the control of insects affecting pechay.
Philipp. Agric., 1955, **39**: 420-7, bibl. 14.

The effect of methoxychlor, dieldrin and DDT sprays on pechay or Chinese cabbage (*Brassica pekinensis*) and its pests was studied. Only dieldrin had a slight burning effect on the leaves. Yields after a 2-spray schedule were highest from dieldrin-treated plots and after a 4-spray schedule from the DDT-treated plots. DDT-sprayed plots had the highest average percentage of leaves undamaged by caterpillars, while dieldrin-sprayed plots had the highest percentage of leaves uninfested by aphids.

428. Rosborough, T.
Further experiments in turnip gall weevil control.
Plant Path., 1956, **5**: 111.

a cabbage field attacks of *Ceuthorhynchus pleuro- igma* were significantly reduced by dusts of 2% BHC, 5% and 5% dieldrin and 1·5% aldrin. Aldrin and eldrin 1·5% dusts also gave significant control of ll weevil in cabbage seed beds.

29. McEwen, F. L., and Hervey, G. E. R.
An evaluation of newer insecticides for control of DDT-resistant cabbage loopers.
J. econ. Ent., 1956, **49**: 385-7, bibl. 13.

ndrin, isodrin, and Shell OS-2046 gave excellent ntrol of the cabbage looper (*Trichoplusia ni*) in estern New York. Dieldrin, toxaphene, Bayer 17147, rathion, Diazinon and a mixture of DDT and para- ion did not give practical control. A combination parathion and toxaphene reduced looper populations 75% in these tests.

30. Tanada, Y.
Microbial control of some lepidopterous pests of crucifers.
J. econ. Ent., 1956, **49**: 320-9, bibl. 12.

ris rapae caterpillars were successfully controlled in field by granulosis virus (*Bergoldia virulenta*) and bacterium (*Bacillus thuringiensis*). The bacterium led the caterpillars more quickly than did the virus. rvae of the diamond back moth (*Plutella maculi- nnis*) were slightly more resistant to the bacterium. bbage webworm (*Hellula undalis*) and cabbage per (*Trichoplusia ni*) were much more resistant to *thuringiensis* than the other 2 species and higher ncentrations were required for control. The wetting nt Triton B-1956 did not affect the virulence of the s or bacterial sprays, but it increased their efficiency waii agric. Exp. Stat., Honolulu. [See also *H.A.*, 1715.]

1. Endrigkeit, A.
Zur vorbeugenden Bekämpfung der Kohlschabe (*Plutella maculipennis* C.) mit HCH im Wurzeltauch-, Anzuchtbeet- und Pflanztopfbegiessungsverfahren. **(Preventive control of diamond back moth with BHC in root dipping, nursery bed and pot watering experiments.)** [English summary 10 lines.]
Z. PflKrankh., 1956, **63**: 583-6, bibl. 9.

pping the roots of cabbage plants into a BHC ulsion gave 54% control 2 months after treatment, ile root dipping into a BHC and soil mixture gave % control of the diamond back moth. Watering nts in pots with a BHC solution gave 73% control nonths after treatment.

2. Thorne, G. N.
The effect of organophosphorus insecticidal sprays on the growth and phosphorus content of brussels sprouts.
Ann. appl. Biol., 1956, **44**: 499-505, bibl. 8.

dry weights of brussel sprout plants growing in s with high or low available P were generally un- cted by sprays of schradan, demeton or inorganic P itions. In one experiment spraying with schradan with the equivalent amount of P as sodium phosphate reased the P content of plants grown in soils supply- little P. With a high soil P supply sodium phos- te solution slightly but not significantly increased the P content of the plants. Phosphorus content was not affected by demeton sprays.—Rothamsted exp. Stat., Harpenden.

Celery.

(*See also* 380, 420, 548, 577f.)

433. Jacks, H., and Webb, A. J.
A note on field control of celery leaf-spot (*Septoria apii* Chester).
N.Z. J. Sci. Tech. Sect. A, 1956, **38**: 129-31, bibl. 1.

In a field test, ferbam, zineb, thiram, dichlone, and copper oxychloride prevented heavy establishment of *S. apii*. Applications of ferbam, zineb and copper oxychloride were almost equally effective at 7- and 14-day intervals; those of thiram and dichlone were more effective at the shorter intervals. [From authors' summary.]—Plant Dis. Div., D.S.I.R., Auckland.

434. Cox, R. S.
Etiology and control of soil-borne diseases of celery.
A.R. Fla agric. Exp. Stats, 1955, pp. 245-6.

Of the soil fumigants tested, chloropicrin (1 and 2 gal./1,000 sq. ft.) and methyl bromide (1 lb./50 sq. ft.) gave the best control of *Fusarium* yellows, early damping-off, red root and weeds. Formaldehyde, Shell CBP and Vapam were less effective. When fungicides were applied before sowing, disease and weed control were best where effective materials were mixed with the soil in powder form. When drenches were applied after sowing and again at weekly intervals, none of the materials was effective against early damping off or yellows. Chloranil, PCNB, captan, ferbam and dichlone drenches gave complete control of late damping off (*Rhizoctonia solani*). Ziram and ferbam showed a significant reduction in red root severity. Captan and dichlone caused serious injury; the initial effect of ferbam, chloranil and PCNB was harmful but the plants recovered later.

Cucurbits.

(*See also* 377, 378, 400, 401, 403, 455, 527, 576c, l, p.)

435. Ivanoff, S. S.
New cantaloupe released; developed by Experiment Station for home gardens.
Miss. Fm Res., 1956, **19**(1): 1, 7, illus.

The variety Homegarden has an excellent flavour and high sugar content. It is moderately resistant to downy and powdery mildews and highly resistant to aphid attack.

436. Dodillet, H.-J.
Der Einfluss von Hell und Dunkel auf die Keimung der Gurkensamen. **(The effect of light and darkness on germination of cucumber seed.)** [English, French and Spanish summaries 4 lines each.]
Mitt. Klosterneuburg, Ser. B, 1956, **6**: 173-4, bibl. 2.

Germination of several cucumber varieties was observed under various light intensities. No differences in germination were apparent.—Inst. Gemüseb., Tech. Univ., Berlin.

437. Matienko, B. T.
The anatomical structure of the pericarp of cultivated melons (*Melo* Adans.). [Russian.]
Bot. Žurnal, 1956, **41**: 558-60, bibl. 7, illus.

A study of 8 melon varieties belonging to the following 6 species: [*Cucumis*] *melo cantalupa*, *C. m. zard*, *C. m. ameri*, *C. m. adana*, *C. m. chandalak* and *C. m. cassaba.*

438. González Alonso, M.
Inducción a la partenocarpia en la familia "Cucurbitaceae" y particularmente en la especie "*Citrullus vulgaris*". **(Induction of parthenocarpy in Cucurbitaceae, and particularly in *Citrullus vulgaris*.)**
Farmacognosia, 1955, **15**: 379-95, bibl. 24, illus.

In an attempt to produce parthenocarpic fruits flowers of watermelon were treated with 2,4-D, indole-3-acetic acid, potassium α-naphthylacetate, β-indoleacetic acid, indole-3-propionic acid, potassium α-naphthylacetate +2,4-D, or the alkaloids harmin and harmalin. No treatment resulted in completely seedless or mature fruits. The treated fruits were irregular in shape, the growth being greatest around the few fertilized seeds. The best result was obtained with 2,4-D, followed by potassium α-naphthylacetate.

439. Shifriss, O., and Galun, E.
Sex expression in the cucumber.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 479-86, bibl. 8.

In the monoecious varieties of cucumbers, grown under a given set of conditions, the number of nodes from the cotyledon leaves to the node bearing the first pistillate flower on the main stem is a constant racial characteristic. The number of nodes to the first pistillate flower is a fair measure of both sex tendency and maturity. The lower the node number the higher the female tendency and the earlier the variety. A tentative interpretation is presented of the development pattern of sex expression in this plant. [Authors' summary.]—Weizmann Inst. Sci., Rehovot, Israel.

440. Ito, H., and Saitô, T.
Factors responsible for the sex expression of Japanese cucumber. III. The role of auxin on plant growth and sex expression. (I). [Japanese, with English summary $\frac{1}{4}$ p.]
J. hort. Ass. Japan, 1956, **25**: 101-10, bibl. 6, illus.

Several hormone sprays were applied from the cotyledon stage. All treatments retarded plant growth. Male flower formation was unaffected by TIBA, but was retarded by 2,4-D, IAA and NAA. Female flower formation was slightly retarded by TIBA but was accelerated by 2,4-D, IAA and NAA. Results from NAA treatments showed that sex reversion was closely associated with growth retardation. [For parts I and II see *H.A.*, 24: 2667 and 25: 1680.]

441. Barber, G. A.
Flavonoids of staminate and pistillate squash flowers.
Arch. Biochem. Biophys., 1956, **64**: 401-11, bibl. 23.

The conspicuous association of flavonoids with floral parts, e.g. pollen, has led some investigators to suggest that they may play a part in sex expression or in sexual reproduction, but unequivocal evidence in support of this suggestion is lacking. The study reported here presents the results of a paper chromatographic exploration of the flavonoids of male and female flowers of the monoecious Acorn squash, *Cucurbita pepo*. Two distinct glucosides were obtained, one in the anthers tentatively identified as a glucose rhamnoside of isorhamnetin, and the other in the stigmas, which possessed an aglycone similar to but not identical with isorhamnetin and the unusual sugar combination, glucose and fructose.—Dep. Bot., Columbia Univ., N.Y.

442. Olejnik, M. M.
Experiments on the use of supplementary illumination for cucumber seedlings. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 101-9.

Supplementary illumination of cucumber seedlings by means of luminescent and incandescent lamps in January for 1·5–2·5 hrs in the morning and 2–3 hrs in the evening resulted in increased yields. Plants illuminated with luminescent lamps and then grown in the glasshouse gave a yield of 17·5 kg. per sq. m., with incandescent lamps 17 kg. and the controls raised without supplementary light 13·9 kg. The luminescent lamps retarded maturity by 4 days compared with the incandescent lamps and controls.

443. Eaks, I. L., and Morris, L. L.
Respiration of cucumber fruits associated with physiological injury at chilling temperatures.
Plant Physiol., 1956, **31**: 308-14, bibl. 23.

Studies with stored cucumbers have shown that th course and rate of metabolism were changed as a resul of chilling injury. At non-chilling temperatures th rate of CO_2 production decreased with the duration c storage whereas at chilling temperatures the rat increased with time to a plateau that was followed b a decline. The increasing rate occurred at the time c onset and development of chilling injury, and th decline occurred with the general death of tissue. A all non-chilling temperatures cucumbers produce about the same total amount of CO_2 (20 g./kg. frui during their storage life, but smaller amounts wer produced at chilling temperatures.—Univ. Calif Davis.

444. Eaks, I. L.
Effect of modified atmospheres on cucumbers at chilling and non-chilling temperatures.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 473-8, bibl. 5.

Cucumber fruits were held for 8 days at chilling an non-chilling temperatures of 41 and 59° F. in atmo pheres modified (*a*) with respect to O_2 (essentially range of 0 to 100%) with CO_2 held near 0%, an (*b*) with respect to CO_2 (0 to 80%) with O_2 held ne 20%. They were then transferred to air at 77° F During storage at 59° F. the respiration rate of th cucumbers proved to be a function of the O_2 concen tration in the range 1 to about 16%, but at 41° F. (

ncentration had little effect. The subsequent be- viour of the cucumbers in air did not appear to be luenced by the previous O_2 treatment, except for e 0% O_2 treatment. Concentrations of CO_2 which re harmless at the non-chilling temperature in- eased chilling injury symptoms at the chilling tem- rature.—Univ. Calif., Davis.

45. Barham, W. S.
A study of the Royal Golden watermelon with emphasis on the inheritance of the chlorotic condition characteristic of this variety.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 487-9, bibl. 2.

raying plants of this watermelon variety with 10 fferent nutrient solutions failed to halt the character- ic development of chlorosis in the foliage and stems d yellowing of the rinds of maturing fruits. Inheri- ce studies showed that the character is controlled a single recessive gene.—N.C. St. Coll., Raleigh.

46. Shepherd, R. J., and Struble, F. B.
Tobacco ringspot virus on watermelon.
Phytopathology, 1956, **46**: 358-62, bibl. 12, illus.

mechanically transmitted virus was found constantly ociated with the pimples disease of watermelons in ahoma. This virus was identified as a yellow ain of the tobacco ringspot virus. It was trans- ted from watermelon to watermelon in 1 of 48 trials the differential grasshopper (*Melonaplus differen- is*) but not in any of 45 trials with melon aphids *his gossypii*). There was no evidence of trans- ion of this virus by watermelon seed. A thermo- le inhibitor of virus infection was demonstrated in from watermelon fruits and foliage. [From authors' mary.]—Okla agric. Exp. Stat., Stillwater.

7. Beecher, F. S.
Control of downy mildew of muskmelons with tank mixtures of a fixed copper and a dithio-carbamate.
From abstr. in *Phytopathology*, 1956, **46**: 466.

the 1955 tests at Beltsville, Md, downy mildew, sed by *Pseudoperonospora cubensis*, of muskmelons controlled successfully with several mixtures of asic copper sulphate and a dithiocarbamate, hane Z-78 (65% zineb), with a sticker-spreader, on B-1956 (phthalic glycerol alkyl resins). All gicides were diluted separately before they were ed to the tank. When 1, 2, or 3 lb. of the copper gicide was used with 1 lb. of zineb per 100 gal. of y, control was about equal to that with 2 lb. zineb e. In all combinations 2 lb. of zineb proved er than 1 lb.; however, combinations of 1, 2, or of tribasic copper sulphate with 2 lb. of zineb 100 gal. gave better mildew control than did either gicide applied separately or in an alternating edule. Varying the amount of the copper fungicide n 1 to 3 lb. in the mixture with 2 lb. of zineb resulted o significant differences in control. No foliage ry due to the fungicides was observed. [See also ., 26: 3742.]

Legumes.

(*See also* 12, 13, 15, 16, 21-23, 26, 28, 38, 39, 64, 66y, 67c, 341, 373, 374, 381, 399, 422, 576f, g, j, l, r, w, 577a, m.)

448. Kaplan, L.
The cultivated beans of the prehistroic Southwest.
Ann. Mo. bot. Gdn, 1956, **43**: 189-251, bibl. 82, illus.

A study based on collections of cultivated beans (*Phaseolus*) from contemporary Southwest Indian peoples and on bean remains from prehistoric sites in the same area, which includes the present states of Arizona and New Mexico, together with parts of Utah, Colorado, Texas, Nevada, California and northern Mexico.

449. Ross, E., Brekke, J. E., and Moore, J. F.
The objective evaluation of some green bean varieties used for processing in the North-west.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 398-411, bibl. 21.

The following quality measurements were applied to several varieties of Blue Lake runner beans: fibre contents and tough string counts, curvature ratios as a measure of straightness, and colour by spectrophotometry and by the Hunter Color Meter. Differences due to variety, picking time, size and method of processing are recorded.—Wash. St. Coll., Pullman, and U.S.D.A. and W. Wash. Exp. Stat., Puyallup.

450. Ballatore, G. P., and Mirto, G.
Ricerche sperimentali sulla jarovizzazione della fava da granella (*Vicia faba major*). **(Experimental studies on vernalization of the broad bean, *Vicia faba major*.)** [English summary $\frac{2}{3}$ p.]
Ann. Sper. agrar., 1956, **10**: 1457-86, bibl. 59, illus.

Experiments carried out over a 4-year period showed that precocity of flowering induced by vernalization was only 7–8 days in February sowings compared with 28–29 days in November sowings. Soaking the seeds in 50 p.p.m. aqueous vitamin B_1 or Knopp's solution before germination, whether followed by vernalization or not, gave the same results as soaking in distilled water. The duration of vernalization had no effect on flowering date in February sowings, but in autumn sowings flowering was significantly earlier from 33–35 days' than from 24–25 days' treatment, and 2°–4° C. was a more effective vernalizing temperature than 6° C. Identical treatments before autumn sowing induced different flowering dates according to winter temperatures, cold winters enhancing the effects of artificial vernalization. Neither physiological maturation nor yield were affected by vernalization, the only advantage being earlier production of young pods, especially in regions of mild climate.

451. Paci, P.
Prove di vernalizzazione a freddo su alcune cultivar di pisello. **(Experiments on cold vernalization of certain pea varieties.)** [English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1956, **40**: 320-31, bibl. 57.

Exposure of seeds to temperatures of 2°-3° C. for 20, 40 or 48 days after activation by soaking, had no significant effect on growth, flowering date or yield of the five pea varieties tested.

452. Repp, G., and Killian, C.
Recherches écologiques sur les relations entre le climat, les sols et les plantes irriguées des oasis sahariennes. **(Ecological studies on relationships between climate, soils and irrigated plants of Saharan oases.)**
J. Agric. trop. Bot. appl., 1956, **3**: 292-319, bibl. 19.

Broad bean (*Vicia faba*) is one crop for which data are included regarding the effects of high and low soil moisture content on osmotic pressure, suction force, weight loss during wilting, saturation deficit and production of dry matter. Treatment of the seeds with the fertilizer "aumentan" gave a 60% yield increase.

453. Rappaport, L., and Carolus, R. L.
Effects of night temperature at different stages of development on reproduction in the lima bean.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 421-8, bibl. 14.

Experiments were carried out to determine: (*a*) the influence of pre- and post-bloom night temperatures of 50, 60 and 70° F. on the growth and fruiting of Henderson Bush lima beans, and (*b*) the influence of night temperatures of 60 and 67° F. during 4 specific growth stages on the subsequent fruiting of Henderson Bush and Fordhook 242. Although the two varieties, both regarded as heat-resistant, showed some differences in sensitivity to temperature, they both responded to high night temperatures during early flower bud development by maturing more quickly and by producing lower numbers and weights of seeds.—Mich. St. Univ., E. Lansing.

454. Rosić, K.
Uticaj nekih načina gajenja na prinose pasulja tetovca. **(The effect of new methods of culture on yield of beans.)** [English summary 2 pp.]
Arh. poljopr. Nauk., 1955, **8**(22): 101-24, bibl. 7.

The best average yields of *Phaseolus* beans were obtained after irrigation by flooding. Mulching was slightly less effective but is a promising method of culture for small areas without irrigation. Sprinkler irrigation affected the normal development of flowers and fruit, and raised the air humidity during the periods of flowering, and pod and seed formation. The lowest yields resulted from a mixed culture of beans with maize. Combining the several methods of cultivation did not positively affect yields.—Inst. agric. Res., Peć.

455. Smith, R. L., and Wallace, A.
Influence of nitrogen fertilization, cation concentration and root cation-exchange capacity on calcium and potassium uptake by plants.
Soil Sci., 1956, **82**: 165-72, bibl. 13.

Beans (*Phaseolus vulgaris*) were grown in nutrient solutions with varying Ca/K ratios. Stimulation of Ca^{45} uptake by K was slight at some concentrations and absent at others. As Ca concentration decreased the fall of Ca^{45} uptake was approximately proportional to the square root of the reduction in concentration. Uptake of K^{42} was depressed by reducing the K/Ca ratio for given concentrations of K. There was no evidence of Ca stimulation of K uptake. With decreasing K concentration the fall in K^{42} absorption was about twice as great in high-salt as in low-salt roots and the relationships were linear. Root cation-exchange capacity was directly proportional to K accumulation (instead of inversely as expected from work with soil) and to the square of Ca accumulation. For cucumbers grown in resin-sand-clay mixture N levels had no apparent effect on root cation-exchange capacity or on cation uptake, but differences in cation absorption were related to root respiration rate.

456. Rai, G. S., Hamner, C. L., and Cook, R. L.
Effect of biuret on bean plants grown in different soil types.
Quart. Bull. Mich. agric. Exp. Stat., 1956, **39**: 88-96, bibl. 6, illus.

Soil applications of biuret, C.P. urea and commercial urea were made on a basis of 10, 20 and 40 lb. of N per acre to pots containing equal volumes of muck, clay loam and sandy soils. Soon after treatment bean seeds were sown and the plants harvested 25 days later. The plant tops were analysed. Results showed tha biuret suppressed the growth of bean plants, the highe the rate the greater the injury, the injury being mos serious on the clay loam soil. Soil applications o biuret resulted in consistent increases in the percentages of N and P and slight increases of Fe and in some cases. J.R.L.

457. Prest, R. L.
Side dressing French beans.
Qd agric. J., 1956, **82**: 377-80, illus.

Fertilizer trials conducted to test the efficiency o nitrogenous side dressings applied at different time have established that the maximum benefit is obtaine when sulphate of ammonia (1 cwt. per acre) is applie about 2 weeks after the seed germinates. The colou of the crop was improved but not the yield when the sid dressing was applied at the start of flowering. In creased yields have occasionally been obtained b including superphosphate in the side dressing.
J.R.L.

458. Gustafson, F. G., and Schlessinger, M. J., Jr.
Absorption of $cobalt^{60}$ by leaves of bean plants in the dark.
Plant Physiol., 1956, **31**: 316-18, bibl. 5, illus.

Radioactive cobalt chloride was applied to a prima leaf of 2-week-old bean plants which had been in dar ness for the previous 48 hours. The $cobalt^{60}$ entere the leaf, but after 6 hours was still predominant in the tissue adjacent to the area of application.—Uni Mich., Ann Arbor. [See also *H.A.*, 26: 2359.]

459. Wallace, A., and Ashcroft, R. T.
Ammonium lignin sulfonate as a chelating agent for supplying soluble iron to plants.
Soil Sci., 1956, **82**: 233-6, bibl. 5.

Runner beans grown in pots of slightly acid clay lcareous loam were supplied at, or 10 days after, anting with Fe at 0, 46, 92 or 230 lb. per acre. The source was prepared from ammonium lignin lphonate (a by-product of wood pulping), sodium droxide to produce pH 12, and labelled Fe_2SO_4. H_2O. Dry weight of bean leaves was no higher with, an without, Fe treatment, but chlorosis develop- g on the calcareous soil was not present in treated ants. Uptake of Fe increased with the application te. On the clay soil Fe applied 10 days after planting tered only the young leaves, but on calcareous loam was found also in older leaves.

60. BERNSTEIN, L., AND PEARSON, G. A.
Influence of exchangeable sodium on the yield and chemical composition of plants: 1. Green beans, garden beets, clover, and alfalfa.
Soil Sci., 1956, **82**: 247-58, bibl. 13.

rmination of beans and beet was significantly luced by increase of exchangeable Na in a loam soil low and a clay soil of high exchange capacity. Treat- nt of the soils with the conditioner VAMA before plying Na almost eliminated this effect. Seedling wth in beans was very adversely affected, showing ar stunting and root necrosis, at high Na levels even the conditioned soils. Increase of Na brought ut a progressive decrease in bean yield, but with the yield of tops on both soils and that of roots he clay soil were stimulated in the presence of MA by raising exchangeable Na from 2% to 18% 35% in the loam and from 4% to 24% or 37% in High Na levels (45%–60%), however, depressed ds. In both crops the Na content was increased the Ca content decreased by raising the Na level. eet there was a corresponding decrease in Mg, in beans Mg increased at intermediate Na levels. ake of K by beet fell with increasing uptake of Na. he lowest Na level VAMA slightly reduced growth.

1. MITCHELL, J. W., PRESTON, W. H., JR., AND BEAL, J. M.
Stem inoculation of Pinto bean with southern bean mosaic virus, a promising method for use in screening chemicals for antiviral activity.
Phytopathology, 1956, **46**: 479-85, bibl. 6, illus.

s paper describes (1) a method of producing stem ctions in Pinto bean plants (*Phaseolus vulgaris* L.) southern bean mosaic virus; (2) the use of histo- cal techniques to indicate tissues in which the s multiplied most readily; (3) the use of triphenyl- azolium chloride and of inoculations to Pinto beans determining the presence of virus in such tissues. m authors' introduction.]—Hort. Crops Res. nch, agric. Res. Serv., U.S.D.A., Beltsville, Md.

2. ZAUMEYER, W. J., AND WESTER, R. E.
Control of several fungus diseases of beans and lima beans with antibiotics.
From abstr. in *Phytopathology*, 1956, **46**: 470.
New antibiotic weapons.
Agric. Res. Wash., 1956, **4**(12): 16.

somycin protected beans from rust (caused by *nyces phaseoli* var. *typica*) and lima beans from downy mildew (caused by *Phytophthora phaseoli*). Mycostatin (fungicidin) protected beans from anthracnose (caused by *Colletotrichum lindemuthianum*) and gave partial protection against bean rust. Oligomycin protected lima beans from downy mildew and stem anthracnose (caused by *C. truncatum*) and beans from rust and bean anthracnose. Griseofulvin protected beans from rust, whereas Filipin protected lima beans from downy mildew and partially protected them against bean anthracnose; both were ineffective against infection by the other fungi. Rimocydin failed to protect beans and lima beans from infection by any of the pathogens tested.

463. JACKS, H., AND WEBB, A. J.
Field tests for control of broad-bean rust.
N.Z. J. Sci. Tech. Sect. A, 1956, **38**: 157-9, bibl. 1.

In field tests carried out over 3 seasons to assess the value of sprays against broad-bean rust (*Uromyces fabae*) the outstanding materials were zineb and ziram. Other materials gave similar control, but for shorter periods. [From authors' summary.]—Plant Dis. Div., D.S.I.R., Auckland.

464. OXENHAM, R. L.
Bean rust control.
Qd agric. J., 1956, **82**: 319-20, illus.

Recent experiments have shown that 100% sulphur dust and zineb sprays (2 lb. 65% active material in 100 gal. water) give good control of rust (*Uromyces appendiculatus*) on french beans when applied at weekly intervals starting at the 2–4 leaf stage. Sulphur will also control angular leaf spot (*Isariopsis griseola*) but may damage the flowers and young pods during warm weather.

465. PRESTON, W. H., JR., AND OTHERS.
Effects of absorbed and translocated F-17 culture filtrate antibiotic factors on the bean rust organism.
From abstr. in *Phytopathology*, 1956, **46**: 469.

A crude culture filtrate from *Streptomyces cinnamoneus* F-17 (supplied by Northern Utilization Research Branch, Agricultural Research Service) contained antibiotics that controlled the bean rust pathogen, *Uromyces phaseoli* var. *typica*, under greenhouse conditions even when diluted to $\frac{1}{16}$ of the original concentration.

466. MOSTAFA, M. A., AND GAYED, S. K.
Effect of herbicide 2,4-D on bean chocolate-spot disease.
Nature, 1956, **178**: 502, bibl. 8.

Leaflets of cut broad bean shoots were dipped for 5 days in water or a 2,4-D solution and were then sprayed with a spore suspension of *Botrytis fabae*. The percentage infection in shoots previously treated with 2,4-D was markedly lower than in those dipped in water or in the freshly-cut undipped controls. No pathological differences were apparent in the anatomy of infected leaflets under varying treatments. Treatment with 2,4-D, however, resulted in a depletion of the carbohydrate content of the leaves, especially sucrose; it is suggested that this depletion may interfere with the normal pathogenic potentiality of the fungus.—Univ. Cairo, Giza.

467. deZeeuw, D. J., Guyer, G. E., and Andersen, A. L.
Fungicide and insecticide seed treatments of peas and beans, 1953-55.
Plant Dis. Reptr, 1956, **40**: 727-33, bibl. 6.

Several seed treatments for peas and beans were tested in 3 years' trials. Most of the treatments which included captan, thiram, or dichlone were beneficial for both crops. Mercury compounds generally gave less consistent protection. Ethyl B-856, an experimental material, was as effective as captan or thiram. Insecticides were generally beneficial to beans but were usually slightly harmful to peas.

468. Sánchez P., A.
Efectividad de varios fungicidas usados solos y en combinación para el control del damping-off y la pudrición de semillas en arvejas y fríjoles. **(Effectiveness of various fungicides used singly and in combination for control of damping off and seed rot in peas and beans.)** [English summary 1 p.]
Acta. agron. Palmira, 1956, **6**: 1-35, bibl. 40, illus.

Of the 6 fungicides selected from preliminary trials and used to disinfect pea and kidney-bean seeds grown at soil temperatures of 16°–20° C. and 20°–24° C., Orthocide 75 (N-trichloromethylthio-tetrahydrophthalamide) gave by far the best results. Next in descending order of efficiency came Arasan SF-X (tetramethylthiuram disulphide), Agrox (phenyl mercury urea), Semesan (hydroxymercuric chlorophenol) and C & C L-224 (mercury-zinc chromate). Results from Spergon (tetrachloro-p-benzoquinone) were very poor. There was no significant improvement in results from the most effective products when they were used in combination or at rates higher than those recommended by the manufacturers. In a few instances combination reduced effectiveness. Damping-off was more common at the higher soil temperatures, where *Fusarium* and *Rhizoctonia* spp. outnumbered *Pythium* in diseased seedlings. At the lower temperatures *Pythium* spp. predominated.

469. Boosalis, M. G.
Effect of soil temperature and green-manure amendment of unsterilized soil on parasitism of *Rhizoctonia solani* by *Penicillium vermiculatum* and *Trichoderma* sp.
Phytopathology, 1956, **46**: 473-8, bibl. 6, illus.

The investigations described in this paper are for the most part mycological, but a short account is given of studies on the biological control of *Rhizoctonia* damping-off and seedling blight of peas. Nearly complete control resulted when sterilized soil was infested simultaneously with pure cultures of *Penicillium vermiculatum* and *R. solani*, but little or no control was obtained from a comparable treatment in unsterilized soil.—Neb. agric. Exp. Stat., Lincoln.

470. Brett, C. H., and Brubaker, R. W.
Potato leafhopper control on snap beans.
J. econ. Ent., 1956, **49**: 571.

Of dusts applied at about 25 lb./ac., perthane 5%, methoxychlor 5% and Strobane 20% were the most effective against *Empoasca fabae* on snap beans in North Carolina in 1955.

471. Delanoue, P.
Lutte biologique contre le puceron de la fève. **(Biological control of the broad-bean aphid.)**
Rapp. Serv. bot. agron. Tunis, 1955, 1956, pp. 163-7.

In order to maintain sufficient 7-spot ladybirds t control broad-bean aphids in the Tunis area, a larg number of species of *Asclepias* and allied genera wer tested as host plants for the aphids. The most promising were *A. linifolia*, *A. angustifolia*, *Ibatia maritima* an *Philibertia gracilis*.

472. Harries, F. H.
Variation in effectiveness of derris dusts against the pea aphid.
J. econ. Ent., 1956, **49**: 363-7, bibl. 14.

In laboratory tests the reasons for differences i effectiveness of derris dusts against pea aphid (*Macrosiphum pisi*) were studied. The effects of temperatur and R.H. were not important. Moisture increased th residual action of the dusts while the plants were wet but after drying most of the residual action was lost Talc impregnated with derris extract was significantl more toxic than other derris-talc dusts with the sam rotenone content. Dust toxicity did not increase wit derris content, but did increase with greater fineness o grinding of the derris root. The kind of dilutent an its particle size had a marked effect on toxicity.—Agric Res. Serv., U.S.D.A.

473. Proctor, J. M.
Is damage from pea midge increasing?
Grower, 1956, **46**: 1045-7, illus.

Control trials based on Dutch experience were carrie out on pea crops in 1956. Results show that immediately the first adult midges appear the peas should b sprayed with DDT at high pressure at not less tha 3 pints of 20% emulsion concentrate per acre. second spray may be necessary.

Mushrooms.

(*See also* 576u, 992.)

474. Thomas, P. T., Evans, H. J., and Hughes, D. T.
Chemically induced neoplasms in fungi.
Nature, 1956, **178**: 949-51, bibl. 19, illus.

Recent work has shown that fungi may be particularl favourable test organisms for studying the problem cancerous neoplasms in animals. In experiments wit the cultivated mushroom (*Agaricus campestris*) trea ment with volatile mineral oils and coal-tar product particularly diesel oil, repeatedly induced tumorou malformations. The morphological development an cytology of the tumours is described. *Collyb velutipes* has shown certain advantages over the cult vated mushroom for experimental purposes.

475. Dieter, A.
Einfluss von Nematodenbevölkerungen auf den Ertrag von Champignonzuchtanlagen. **(The effect of nematode population on yield of mushroom beds.)**
Dtsch. Gartenb., 1956, **3**: 149-51, bibl. 9.

Increasing nematode populations resulted in decreas in mushroom yields. The majority of the nematod re found in the lower layers of the beds. The best thod of control is formalin disinfection of the tivation area.

76. GOODMAN, R. N.
Effects of organic fungicides and antifungal antibiotics on mushroom mildew, *Dactylium dendroides* and lipstick mold, *Geotrichum* sp.
Plant Dis. Reptr, 1956, **40**: 714-17, bibl. 2, illus.

e organic fungicides Terraclor and Dowicide A, and antifungal antibiotics Actidione, Anisomycin, isomycin, Griseofulvin, Rimocidin and Oligomycin e applied as drenches to mushroom beds for mildew ntrol. At 500 or 1,000 p.p.m. Terraclor was highly ective in controlling both mildew and lipstick mould.

Onions and allied crops.

(*See also* 374, 379, 380, 576m, t, 659.)

77. MASUDA, T., AND HAYASHI, K.
Studies on seed production in onion. [Japanese, with English summary 1 p.]
Sci. Rep. Fac. Agric. Okayama Univ., 1956, No. 8, pp. 45-54, bibl. 11, illus.

ion flowering was studied in 1952, when it lasted for days. The number of flowers open on any one was influenced by the amount of sunshine on that the previous day. The styles of the onion flowers ually elongated with maturity, reaching 4 mm. or re after all anthers had dehisced. Onion flowers e receptive from the second to the fifth days after ning.

8. PLAISTED, R. L.
Onion field plot technique.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 390-7, bibl. 9.

ee methods of controlling the stand of onion plants iformity trials were compared in trials in 1953 and 5: (*a*) sowing a fixed number of seeds with no sub- nt thinning; (*b*) sowing excess seeds and later ning to a fixed number of plants per row; and sowing excess seeds and later thinning to a fixed ng. The last two methods were satisfactory vided guard segments were left at the ends of the and yields were adjusted to a common stand by riance. The efficiency of the plots increased as ratio of their length to their width decreased, and of blocks as the ratio of their length to their width eased. The most efficient plot size was 4 rows by 5 ft. long. The number of replications needed etect differences of a given percentage of the mean inversely proportional to the width of the plot.— St. Coll., Ames.

9. MIYAZAKI, Y.
Seasonal changes in water contents and some physico-chenical properties of the expressed sap of *Allium fistulosum* Linn., especially their relation to cold resistance. [Japanese, with English summary $\frac{1}{2}$ p.]
J. hort. Ass. Japan, 1956, **25**: 94-100, bibl. 42.

nges in water content in tissues of both green and e portions of Welsh onion were related to variations ir temperature during the winter. As a result of er loss in the winter, the refractive index and the osmotic concentration of the sap increased. Water-soluble materials and non-osmotically active materials were found to accumulate during the winter. Increases in relative conductivity and relative viscosity of the cell sap were also noted. It is concluded that the increase in cold resistance of *Allium fistulosum* during the winter may be due to the increase of viscid materials and electrolytic ions within the cells.

480. CAVAZZA, L.
Esperienze di concimazione alla cipolla. Influenza dello zolfo sulle proprietà organolettiche dei bulbi. (**Experiments on fertilizing of onions. Influence of sulphur on the organoleptic properties of the bulbs.**) [English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1956, **40**: 201-12, bibl. 28, illus.

Onions grown in terra rossa alluvium containing 0·106% of sulphur [estimated] as SO_2 showed no yield response to SO_4 in fertilizers. Pungency of flavour was reduced by NH_4 and more markedly by Cl, the mildest bulbs coming from plots treated with NH_4Cl. Further experiments, involving NO_3 fertilizers, are proposed.

481. DAVIS, J. F., AND OTHERS.
The effect of fertilizer placement on the yield of onions and spinach grown on organic soil.
Quart. Bull. Mich. agric. Exp. Stat., 1956, **39**: 25-35, bibl. 1.

Results of experiments carried out on Downings Yellow Globe onions from 1951-55 and on Nobel spinach since 1952 show that the yield can be increased as much as 103 and 50% respectively and be of better quality, if the method of fertilizer application is correct. In both cases the highest yields were obtained where the fertilizers were placed in a band 2 in. below the seed level or in a band 1 in. to the side and 2 in. below the seed level, at a rate of 400–500 lb. of 5–10–20 fertilizer per acre. Quantities in excess of 800 lb. per acre were best applied ahead of planting, broadcast on the surface or ploughed under. The amount of fertilizer that could be safely applied in a band 2 in. below the seed depended on the amount of moisture in the seed-bed at planting time, the row spacing and the maintenance of the desired depth of 2 in. below the seed over the whole area.
J.R.L.

482. WIGGELL, D.
Control of white rot in onions.
Plant Path., 1956, **5**: 60-1.

Treatment with calomel dust at $\frac{1}{2}$, $\frac{3}{4}$ and 1 lb. per lb. of seed against white rot of onions (*Sclerotium cepivorum*) was compared with calomel application to the drill and with untreated controls. The percentage germination was unaffected by the treatment. All treatments were significantly better than the control, but the highest cash return was obtained by seed treatment with $\frac{3}{4}$ lb. calomel per lb. of seed.—N.A.A.S., Leeds.

483. FJELDDALEN, J., AND STENSETH, C.
Bekjempelse av løkflue (*Hylemyia antiqua Meig*). Foreløbig melding. (**Onion fly control. Preliminary communication.**) [English summary 2 pp.]
Meld. Stat. Plantevern **11**, 1956, pp. 25.

Aldrin, chlordane, DDT, dieldrin, lindane and parathion were used in tests on onion fly control carried out in 1953–55. (1) *Onions grown from seed:* Two spray applications at oviposition and a fortnight later were as effective as watering the plants twice with specified dosages of the insecticides, but these measures are recommended for small areas only. For growing the crop on a larger scale seed pelleting proved to be the most successful method, 50% wettable dieldrin powder at the rate of 100 g. per kg. seed giving the best over-all results. (2) *Onion sets:* Here too spraying or watering was satisfactory in small fields, while for commercial purposes immersion of the plants for two minutes in emulsions of the insecticides (concentrations stated) is likely to become the standard method. The work on onion fly control is being continued.

484. Finlayson, D. G.
Maggots and puparia in stems and seed balls of onions at harvest.
J. econ. Ent., 1956, **49**: 460-2, bibl. 1, illus.

Seed heads and stems of onions and samples of commercial seed were found to contain maggots and puparia of 6 species of Diptera including *Hylemyia antiqua*, *H. cilicrura* and *Paragopsis strigatus*. Nearly twice as many flies were found to emerge from the unthreshed as from the threshed heads. Treating puparia mixed with seed with dieldrin or DDT prevented flies from emerging or killed them on emergence. —Ent. Lab., Kamloops, B.C.

485. Richardson, B. H., and Wene, G. P.
Control of onion thrips and its tolerance to certain chlorinated hydrocarbons.
J. econ. Ent., 1956, **49**: 333-5, bibl. 11.

In trials at 2 locations control of onion thrips (*Thrips tabaci*) was obtained with the following combinations: BHC plus DDT, dieldrin plus parathion, heptachlor plus parathion dust, malathion plus dieldrin, malathion plus heptachlor, and malathion plus Perthane. No control was obtained with dieldrin, heptachlor or toxaphene sprays alone.—Texas agric. Exp. Stat.

486. Shirck, F. H., and Douglass, J. R.
Experiments on control of the onion thrips in Idaho.
J. econ. Ent., 1956, **49**: 526-9, bibl. 7, illus.

In this final report on the investigation into thrips (*Thrips tabaci*) control on onions conducted from 1945 to 1952 it is shown that dieldrin, heptachlor, parathion and toxaphene were the most effective insecticides used. Low volume sprays of 9¾ gal./ac. applied with a turbine blower or of 25 gal./ac. with a gear-pump sprayer were as satisfactory as 100–150 gal./ac. with a tractor power sprayer. DDT and toxaphene were effective when applied as dusts, although more material was required than in the sprays. A significant yield increase was obtained when DDT aerosol was applied to individually bagged seed umbels in 1945, but dust treatments of seed onions did not increase yields significantly in any of the 5 years when tests were made.

487. Tabing, L. M., and Gonzalez, L. G.
Influence of different applications of maleic hydrazide on the keeping quality of onions.
Philipp. Agric., 1956, **40**(1): 7-10,* bibl. 2, illus.

Three concentrations of maleic hydrazide sprayed before harvesting completely inhibited sprouting of onion bulbs in storage. Sprayed plants had significantly more marketable bulbs after 4 months in storage. The treatment did not affect colour, flavour or odour of the bulbs.

488. Sawyer, R. L., and Dallyn, S. L.
Vaporized chemical inhibitors and irradiation, two new methods of sprout control for tuber and bulb crops.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 514-21, bibl. 17, illus.

This paper describes experiments on the use of chemicals to prevent sprouting in potatoes and of gamma irradiation to prevent sprouting in potatoes, sweet potatoes and onions. With onions a gamma irradiation dosage of 8,000 r. for 48 hours completely inhibited sprouting. A dosage of 4,000 r. prevented sprouting of bulbs held at 65° F. but was not entirely effective for bulbs held at 55° F. In a preliminary trial fast electron irradiation failed to check sprouting.—Cornell Univ., N.Y.

Rhubarb.

489. van Hoof, H. A., and Tolsma, S.
Virusziekte bij rabarber. (**Virus infection of rhubarb.**) [English summary 6 lines.]
Meded. Dir. Tuinb., 1956, **19**: 761-4, bibl. 5, illus.

Cuttings were taken from healthy and virus-infected plants of Champagne-rood rhubarb and the yields were compared. In the first year after propagation there was little difference in yields, but in the second year. when moderate virus symptoms were apparent in the infected plants, yields from them were 23·6% less than from the healthy plants and cutting began later.

Root crops.

(*See also* 17, 375, 407, 544, 576s, w, 577g, h.)

490. Pringle, J., and Williamson, W. T. H.
Some effects of a soil conditioner on a heavy and a light soil in Aberdeenshire.
J. Sci. Food Agric., 1956, **7**: 540-5, bibl. 9, illus.

This paper is mainly concerned with experiments on a heavy soil sown to wheat, but brief mention is made of the response of carrots on a well fertilized, light soil On this soil treatment with 0·05% CRD-186 (a viny acetate-maleic anhydride polymer) resulted in earlie germination, consistently better growth and larger and better-shaped roots in two successive seasons.—Dep Soil Sci., Univ. Aberdeen.

491. Hawthorn, L. R., Bohart, G. E., and Toole, E. H.
Carrot seed yield and germination as affected by different levels of insect pollination.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 384-9, bibl. 11.

Red Core Chantenay carrots grown at Logan, Utah, in 1954 were subjected to 4 pollination treatments. In terms of both total seed and viable seed, plants caged with a colony of honey bees produced a significantly higher yield than uncaged, open-pollinated plants. Plants caged to admit only tiny insects produced les

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* Cited as 627-30.

an half, and plants caged to exclude all insects less
an 10%, of the seed produced by bee-pollinated
nts. These two latter treatments led to the develop-
nt of a considerable proportion of abnormally
ge seeds as well as of undeveloped ovaries, and
produce an acceptable commercial seed sample both
large and undeveloped seeds had to be removed.—
S.D.A., Logan, Utah, and Beltsville, Md.

92. Kho, Y. O., and Braak, J. P.
Reduction of the yield and viability of carrot seed in relation to the occurrence of the plant bug *Lygus campestris* L. [Dutch summary ⅓ p.]
Euphytica, 1956, **5**: 146-56, bibl. 11, illus.

periments showed that the presence of *Lygus*
npestris bugs on the flower umbels of carrots caused
only a reduction in seed production due to abortion
endosperm and embryo but also a reduction in
mination percentage of full-grown seeds due to lack
embryo. When the bugs were placed on caged
bels before or during anthesis the reduction in seed
duction and viability was more serious than when
bugs were introduced after anthesis.—Inst. hort.
nt Breed., Wageningen. [See also *H.A.*, 26: 3792.]

3. Poapst, P. A., and Phillips, W. R.
Storage of carrots in polyethylene bags.
From abstr. in *Rep. Canad. Cttee Fruit Veg. Pres. 1955*, 1956, p. 4.

rots which had been stored in perforated poly-
iene bags for 2 months at 32° F. were of excellent
ure, while bulk-stored carrots were slightly flexible.
bagged material had a secondary disagreeable
ur, probably due to contamination acquired by the
ic.—Centr. exp. Fm, Ottawa.

Krickl, M.
Die Züchtung von nicht pelzig werdenden Radieschen und Rettigen. (**The selection of radishes producing no stringy roots.**) [English, French and Spanish summaries 6–7 lines each.]
Mitt. Klosterneuberg, *Ser. B*, 1956, **6**: 269-81, bibl. 3, illus.

as been found possible to select radish varieties
h, when grown in late spring or early autumn,
ice few or no stringy roots.

5. Banga, O., and Smeets, L.
Some effects of the photoperiod on growth and pithiness of radishes. [Dutch summary ⅓ p.]
Euphytica, 1956, **5**: 196-204, bibl. 4, illus.

effect of 6 different day lengths at 17° C. on growth
pithiness of 2 radish varieties was studied. At day
ths of 19 and 24 hrs. the plants bolted very rapidly,
4 hrs. more slowly, and at 8, 10 and 12 hrs. very
ly. There was no direct influence of day length
degree of pithiness but there was an indirect effect
ugh the growth rate of the roots, an increase in
size increasing the tendency to pithiness. The
ber of leaves was essentially the same at all day
hs but leaf size increased with longer day length.
increase in leaf size resulted in a higher growth
of the roots until bolting was induced. Induction
olting, however, reduced the growth rate of the roots appreciably.—Inst. hort. Plant Breed., Wageningen.

496. Thompson, B. D.
Hypocotyl discoloration of radishes.
A.R. Fla agric. Exp. Stats, 1955, pp. 121-2, illus.

Two types of hypocotyl discoloration were identified in mature radishes. One, caused by *Peronospora parasitica*, was generally present at harvesting, and was most prevalent during cool moist conditions. The second type of discoloration was not associated with microorganisms and developed after harvesting. It did not develop on radishes grown and harvested during the winter. As the season progressed the discoloration developed on radishes during storage of 2–10 days at 70° F.

497. Fry, P. R., and Jacks, H.
Effect of foliar and soil applications of insecticides on control of aphids and turnip-mosaic virus on swedes.
N.Z. J. Sci. Tech., *Sect. A*, 1956, **38**: 120-3, bibl. 1.

In a glasshouse trial lindane and parathion were effective against *Myzus persicae* on swedes two days after application but not after seven days. In the field, spray applications of lindane, parathion, schradan, TEPP and soil treatments of schradan significantly reduced naturally occurring aphid populations. All materials reduced the incidence of turnip-mosaic virus, parathion being the most effective. Correlation was apparent between aphid numbers and virus incidence and between incidence of virus and yield. [Authors' summary.]—Plant Dis. Div., D.S.I.R.

498. Forbes, A. R., and King, K. M.
Practical application of chemical controls of root maggots in rutabagas.
J. econ. Ent., 1956, **49**: 354-6, bibl. 3.

Swedes were almost all free from fly (*Hylemyia brassicae*) damage after treatment with aldrin or heptachlor sprays. Furrow treatments gave at least 90% reduction in damage, and band treatments gave good commercial control. All treatments greatly increased yields of marketable swedes. Field-scale experiments gave results not significantly different from plot-scale treatments. Good control was obtained in all growers' tests, excepting in a muck soil.—Ent. Lab., Victoria, B.C.

499. Miller, E. V., Army, T. J., and Krackenberger, H. F.
Ascorbic acid, carotene, riboflavin, and thiamine contents of turnip greens in relation to nitrogen fertilization.
Proc. Soil Sci. Soc. Amer., 1956, **20**: 379-82, bibl. 14.

Ascorbic acid content was higher in plants receiving no supplementary side-dressed N than in those supplied with 4 applications each of 20 lb. per acre in addition to the 40 lb. at planting. The effect of N was related to that of inter-plant shading, low ascorbic acid values being obtained in luxuriant plants given high-N treatment. Carotene content was directly related to both N supply and foliar N, and was higher with ammonium nitrate than with sodium nitrate as a N source. Results for riboflavin and thiamine were similar to those for carotene, but without the clear difference between the alternative N sources.

Salad crops.

(*See also* 22, 37, 404, 405, 577d, 604.)

500. Ylagan, M. M., and Ynalvez, L. A.
Possible Philippine sources of vitamins: I. Carotene.
Philipp. Agric., 1956, **39**: 492-5.

Twenty-six samples of Philippine plant materials were analysed for carotene. Lettuce plants which grew in plots exposed to strong sunshine had a lower carotene content than plants in shaded plots.

501. Klešnin, A. F., Osipova, O. P., and Timofeeva, I. V.
The pigment, protein and carbohydrate contents of lettuce plants under artificial illumination. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 60-3, bibl. 12.

The effect of different intensities of red and blue light on the protein, carbohydrate, chlorophyll and carotenoid contents of 2 varieties of lettuce is described and graphically illustrated.

502. Rappaport, L., and Wittwer, S. H.
Flowering in head lettuce as influenced by seed vernalization, temperature and photoperiod.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 429-37, bibl. 19, illus.

Using leaf numbers and days prior to the appearance of the developing inflorescence and days to anthesis in Great Lakes head lettuce, it was found that night temperatures above 65° F. subsequent to seed vernalization accelerated flowering and resulted in seed stalks without preceding head formation. Below 65° F. vernalized plants first produced a high percentage of firm, vegetative heads and then flowered. Non-vernalized plants flowered only at night temperatures above 65° F. At high root temperatures (64 and 71° F.) flowering was promoted, while at low (50 and 57° F.) flowering was delayed. The minimum night temperature following vernalization, at which early flowering was favored, was reduced from 65 to 60° F., when plants were grown at a day length of 16 hours. With a nine-hour photoperiod, irrespective of vernalization, plants produced firm heads, which eventually flowered. A combination of high air and root temperatures and long days appears to promote flowering in seedlings vernalized in excess of 13 days at 40° F. [Authors' summary.]—Mich. St. Univ., E. Lansing. [See also *H.A.*, 26: 679 and 3800.]

503. Rappaport, L., and Wittwer, S. H.
Stimulation of flowering by vernalization of endive seedlings—a preliminary report.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 438-9, bibl. 3, illus.

When endive seed was sown in the open at East Lansing, Michigan, during September to December or sown in cold frames during December and planted out in May the plants made little vegetative growth and flowered between June 25 and July 12. Germinated seedlings vernalized for 20 days at 40° F. also flowered prematurely. By contrast plants started under glass o
April 12 at 65° F. night temperature or in the field o
May 1 produced marketable heads and did not flowe
until August 20–25.

504. Grogan, R. G., and Zink, F. W.
Fertilizer injury and its relationship to several previously described diseases of lettuce.
Phytopathology, 1956, **46**: 416-22, bibl. 31, illus.

A disease of lettuce that has caused considerabl
damage to commercial plantings in California wa
compared with several previously described diseases o
lettuce. The present disease was reproduced by th
application of toxic concentrations of inorganic commercial fertilizer materials or or animal manure
A comparison of the relative toxicity of the severa
fertilizers revealed that those containing ammoniun
hydroxide and free ammonia were most toxic but tha
certain other materials containing nitrites, nitric acid
or phosphoric acid also were toxic. Materials composed of neutral salts such as ammonium sulfate
ammonium nitrate, or calcium nitrate were relativel
innocuous. An explanation of the etiology of th
previously described diseases on the basis of toxi
nitrogen compounds formed during the decompositio
of organic nitrogenous materials in the soil is suggestec
[Authors' summary.]—Univ. Calif., Davis.

505. Canova, A.
Imbrunimento marginale delle foglie di insalata. **(Marginal browning of lettuce leaves.)**
Ital. agric., 1956, **93**: 623-5, illus.

The outer leaves are rarely affected. Yellowis
translucent spots on or near the margins of young
leaves enlarge, thicken and turn brown. The cause
unknown, but lack of balance between root absorptic
and transpiration is suspected. Incidence is highest c
soils of irregular moisture content and coarse textur
high in total soluble and nitrogenous salts but lo
in soluble K and Mg. Low relative humidity
atmosphere also favours the disease, and the mo
succulent "cabbage" varieties are very susceptible.

506. Marlatt, R. B., and Stewart, J. K.
Pink rib of head lettuce.
Plant Dis. Reptr, 1956, **40**: 742-3.

A diffuse pink discoloration of the main leaf ribs a
sometimes of the smaller veins was observed on he
lettuce in Arizona. The colour was due to bright r
areas in or on walls of affected parenchymatous cel
The discoloration could also develop in storage b
low temperatures (37° F.) delayed the appearance
severe symptoms.

507. Bindra, O. S.
On *Mylabris tiplensis* Bill. infesting seed-lettuce.
Indian J. Hort., 1956, **13**: 36-7.

Control of *Mylabris tiplensis* beetles was obtained
hand-picking in the early morning and dropping ir
kerosenized water. Emulsions of aldrin, dieldrin a
parathion were effective in laboratory tests and in fi
trials. Complete control is not desirable as the beet
are useful in the biological control of grasshoppers.
Madhya Bharat Gov., Gwalior.

508. Kvíčala, A.
Nová virová choroba čekanky. **(A new virus disease of chicory.)** [English, Russian and German summaries $\frac{1}{3}$ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 617-26, bibl. 6, illus.

description is given of a new virus disease of cultivated icory (*Cichorium intybus* var. *sativum*), named by the thor chicory blotch and yellows, which according Smith's nomenclature should be called *Cichorium rus 1 sp. nov.* and that of Holmes *Marmor cichorii.* ne host range seems to be limited to chicory. The rus is sap transmissible but no insect vector has yet een found for it.

Spinach.

(*See also* 382, 577c, d.)

09. Thompson, A. E.
The extent of hybrid vigor in spinach.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 440-4, bibl. 4.

ne yields of 12 unselected spinach hybrids were gnificantly greater than those of 3 standard varieties d 8 inbred lines, the average increases in 2 harvests ing 20·1 and 16·3%.—Univ. Ill., Urbana.

10. (LeCompte, S. B., Jr., Szasz, J., and Stern, A. M.)
Soil conditioner aids germination.
N.J. Agric., 1956, **38**(3): 11.

a soil tending to form a crust HPAN and VAMA re applied to improve emergence of spinach seedlings. best emergence and yield were obtained by band atment using about 30 lb. active ingredient per acre; AN increased the fresh weight yield of spinach by %. Overall treatments of the surface soil at the of 0·05% of the top $\frac{3}{4}$ in. of soil gave a yield rease of 110% with HPAN and 70% with VAMA.

11. Sims, W. L., and Gabelman, W. H.
Iron chlorosis in spinach induced by phosphorus.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 445-50, bibl. 13, illus.

nach plants were grown in sand culture with their ot systems divided to facilitate the uptake of P at h levels (500 and 1,000 p.p.m.) when supplied alone in combination with Fe, Zn, Mn or Cu in the trient solution. With P at 500 p.p.m. there were no nificant differences in growth between the treatments, r were any of the minor elements deficient. With P 1,000 p.p.m. only the P+Fe treatment resulted in lorosis and significantly reduced growth, but the leaf ntent of Fe and P in these plants was similar to that und in normal plants receiving the same level of P.—niv. Wis., Madison.

Tomatoes, capsicums and eggplants.

ee also 19, 53, 372, 378, 397, 399-401, 403-406, 419, 576a, b, d, i, l, v, w, y, 577i, j, l, o-q, 594.)

12. Carncross, J. W. [Editor].
America Tomato Yearbook, 1956.
Westfield, N.J., 1956, pp. 40, bibl. 5 pp., $2.00.

is issue contains a list of recent references to tomato culture, diseases, and pests and their control. Other items include statistics on tomato production in the U.S.A. and Canada, and a list of names, addresses and projects of leading research workers on tomatoes in the United States and Canada.

513. Thévenin, L.
Sélection de la tomate. **(Selection of tomatoes.)**
Rapp. Serv. bot. agron. Tunis, 1955, 1956, pp. 115-29.

Results of introductions of new varieties into Tunisia are recorded. Preliminary results are given for selection of strains in the Canatella variety. Fruit characteristics and yields are compared for the F_2 plants of five hybrids. Bounty, Météor and Victor are recommended as mildew-resistant varieties for Tunisia.

514. Pasquier, J.
Compte rendu d'expérimentation sur les piments et les tomates. **(Summary of experiments on capsicums and tomatoes.)**
Rapp. Serv. bot. agron. Tunis, 1955, 1956, pp. 279-86.

Of 8 tomato varieties recently introduced into Tunisia the most successful was Casaque Rouge. Only one imported variety of capsicum, *C. annuum* var. *longum* Frutescens, was of value as a possible disease-resistant parent for breeding. Agents contributing to yellowing and defoliation of capsicums were aleurodes, cicadellids, virus Y, tobacco mosaic virus and *Oidiopsis taurica.*

515. Anon.
El tomate San Marzano rinde mas en pulpa. **(The San Marzano tomato yields more pulp.)**
Not. agric. Serv. Shell Agric. Venezuela, 1956, **1**(10): 3, illus.

In tests at the Cagua Experimental Station San Marzano produced smaller fruits but higher total yields than Rutgers or Marglobe. The weight of pulp from a given weight of fruit was considerably higher from San Marzano than from either of the other varieties, and it is therefore recommended for the processing industry.

516. Korbonits, A.
Paradicsom fajtakísérletek. I. **(Tomato variety trials. I.)**
Konzerv- és paprikaipar, 1955, August, pp. 9-23, from abstr. in *Hung. agric. Rev.*, 1956, **5**(1): 8.

Of 12 varieties of canning tomatoes tested in 9 localities in Hungary, 3, viz. the early variety Kecskemét 42 and the midseason varieties Kecskemét 363 and Scarlet Down, performed well throughout. To obtain a well staggered canning season it is recommended that at least 7 varieties should be grown in each region.

517. Rikovski, I.
The vitamin C value of some Yugoslav varieties of pepper. [Serbian, with English summary $\frac{1}{2}$ p.]
Rev. Res. Work Fac. Agric. Belgrade, 1956, **4**(1): 97-102, bibl. 3.

Ascorbic acid determinations were made on the fruits of 5 varieties of sweet pepper, *Capsicum annuum* subsp. *macrocarpum*, at technical and physiological maturities. The descending order of ascorbic acid content at both stages of maturity was: Tomato-pepper yellow, Somborka white, Kalinkova yellow, Tomato-pepper green and Kalinkova green. It was found that the ascorbic acid content increased with maturity, i.e. the nutritive value of the fully ripe fruits was higher than that of the fruits picked for processing or marketing.

518. Hafen, L., and Stevenson, E. C.
The relationship of temperature, method of pollination, and male sterility to the time required for producing hybrid tomato seed.
Proc. Amer. Soc. Sci., 1956, **67**: 355-60, bibl. 12.

Hand pollination studies with tomatoes showed that the number of successful crosses was greater, the time required to emasculate and pollinate was less, and the number of seeds per fruit was greater when male-sterile plants rather than fertile plants were used as the seed parent [see also *H.A.*, 26: 3815]. Seed was produced more economically at temperatures of 85° F. and below than at temperatures above 85° F. The use of stored pollen at temperatures above 85° F. was more economical than the use of fresh pollen at the same temperatures. The most economical means of producing hybrid tomato seed by hand pollination were the applications of fresh or stored pollen with an ink-blackened matchstick to male-sterile flowers at temperatures below 85° F. [Authors' summary.]—Purdue Univ., Lafayette, Ind.

519. Kormos, J., and Kormos, J.
A paprikatermés szín- és mirigyváltozatai. **(Variations in colour and glands in green peppers.)** [Russian, English, and French summaries ¾ p. each.]
Növénytermelés, 1956, **5**: 141-52, bibl. 11.

Variations were studied in the pigments and vein glands of green pepper fruits. A soft green pepper has been bred which ripens about the same time as the red and yellow peppers. This variety has a high vitamin content and calorific value. The contents of the vein glands show varietal differences; the ethereal content of the pungent gland is about 4 times that of the non-pungent gland.—Inst. Zootaxy, Szeged.

520. Kormos, J., and Kormos, J.
Determinált paprikák. **(Determinate growth in paprika.)** [Russian, English and French summaries ¾ p. each.]
Növénytermelés, 1956, **5**: 1-10, bibl. 11, illus.

Crosses between the small-fruited paprika varieties of the fasciculate group and several cultivated types of the non-fasciculate group gave rise to types with determinate growth in the F_2 generation. These types stop growth early after developing a few shoots with short internodes, and do not develop lateral shoots axillary to the main axis. A classification of the principal types of shoot growth in paprika is presented.

521. Sander, H.
Studien über Bildung und Abbau von Tomatin in der Tomatenpflanze. **(Studies on the formation and decomposition of tomatine in the tomato plant.)**
Planta, 1956, **47**: 374-400, bibl. 42.

Tomatine was determined gravimetrically and identified by paper chromatography. Tomatine is produced chiefly by the shoot. The tomatine content is very variable, may be relatively easily influenced, and is related to plant growth. Decomposition is considered to take place mainly in ripening fruit, because (i) tomatine content decreases with ripening, (ii) injected tomatine rapidly disappears, and (iii) there is a marked accumulation of tomatine in plants which do not bear fruit.—PflPhys. Inst., Freien Univ., Berlin.

522. Korbonits, A.
A paradicsom feldolgozási idény meghosszabbítása egyes termesztési tényezők szabályozásával. **(The prolongation of the tomato canning season by regulating some growing factors.)**
Konzerv- és paprikaipar, 1955, August, pp. 1-9, from English abstr. in *Hung. agric. Rev.*, 1956, **5**(1): 7-8.

Tomatoes planted out after the regular surface frosts produced higher yields than those planted out at the usual dates for given regions. When early transplanting is practised, means of frost protection and a supply of replacement plants should be available. By starting transplanting earlier than usual and using a wide range of varieties and soil types good yields and a well staggered harvest season of canning tomatoes can be obtained.

523. Lityński, M., and Stankiewicz, Z.
Obserwacje nad kwitnieniem i owocowaniem niektórych odmian pomidorów uprawianych w szklarni. **(Observations on the flowering and fruiting of some varieties of glasshouse tomatoes.)** [English and Russian summaries 1 p. each.]
Zesz. nauk. wyz. Szkoły rol. Wrocław, Rolnictwo **1**, 1955, pp. 113-34, bibl. 10.

Studies were conducted at Psie Pole in 1950–1951 o 9 tomato varieties grown with one stem and 5 trusses It was found that the number of leaves between th trusses decreased from the base to the top of the plants The duration of flowering varied between varieties an also between individual trusses. In general the lowe trusses flowered longer than the higher ones. Highe trusses flowered more freely than lower ones, as di late varieties compared with early ones. Youn fruit drop increased as the older fruits grew an developed. The lowest yield of ripe fruits in propo tion to the number of set fruits was produced by sh flowering varieties. In all cases the first truss gave th lightest yield and in general the middle trusses th heaviest. The highest total yield was produced b Stonor's Exhibition and the lowest by Earliest of Al The dry matter content of the fruits varied betwee 4·5 and 7·49% and showed a decrease from the fir to the last truss. Fruits of all the varieties and especial the early ones had a high acid content which was n affected by the position of the trusses.

524. Wittwer, S. H., and Teubner, F. G.
Cold exposure of tomato seedlings and flower formation.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 369-76, bibl. 9, illus.

The two-week interval immediately following cotyled expansion in the tomato seedling is defined as th temperature-sensitive period when flower formati of the first inflorescence occurs. Low temperatu exposure (50–55° F.) of seedlings, in contrast to growth at 65–70° F., during this interval promotes formation of greater numbers of flowers as well as of fewer numbers of leaves preceding the first flower cluster. [See also *H.A.*, 26: 3822.] These flowering responses influenced by low temperature were first associated with greenhouse forcing varieties. Outdoor types, however, both early and late, determinate and indeterminate, responded similarly. Varieties adapted for the West Coast proved a possible exception. Several implications of these findings as related to plant growing practices are discussed. [Authors' summary.]—Mich. St. Univ., E. Lansing.

525. VERKERK, K.
Temperature, light and the tomato. [Dutch summary 1¼ pp.]
Meded. LandbHoogesch. Wageningen, 1955, **55**: 175-224, bibl. 102, illus.

Results of several years' research with tomatoes in California and Holland are summarized and discussed. In good light conditions an increase in average temperatures resulted in faster stem and fruit growth, fewer flowers per truss, fewer fruits, lighter and shorter trusses, lower yields of fruit, and less weight of roots, stems and leaves. Dry weights of leaf discs showed a rise during the first half of the light period and a decrease during the second half. The optimum temperatures for moderate growth and a high fruit yield were 20–23° C. by day and 11–17° C. at night. At lower light intensities temperature effects were less pronounced. A decrease in light intensity or length of day resulted in paler green and rather smaller leaves with lower dry weight, while the truss was considerably reduced. Extra artificial light in winter before planting gave faster growth and sturdier plants, which flowered and fruited earlier but gave lower total yields than the controls. At relatively low light intensity no fruit was formed at 23° C., while some fruits were harvested at 17° C.—Lab. Tuinbouwpl., Wageningen. [See also *H.A.*, 25: 656 and 26: 3828.]

526. JOHNSON, S. P., HALL, W. C., AND LIVERMAN, J. L.
Growth of fruiting responses of intact tomato plants to far-red radiation.
Physiol. Plant., 1956, **9**: 389-95, bibl. 14, illus.

Far-red radiation of winter-grown glasshouse tomatoes (variety Marglobe) induced responses similar to those obtained in natural summer conditions in Texas. Far-red radiation inhibited cell elongation of the stem and growth of young fruits. Summer-induced leaf malformations were reproduced by far-red radiation of winter-grown plants. Abscission of first-formed flowers was accelerated and that of later-formed flowers was reduced by far-red radiation. Flowers receiving far-red radiation formed unfertilized fruits. The results suggest that the quality of radiation is involved in the summer-induced condition of dormancy.—Texas agric. mech. Coll.

527. ČESNOKOV, V. A., AND STEPANOVA, A. M.
The photosynthesis of cucumbers and tomatoes grown under artificial illumination. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 73-80, bibl. 6.

Results of the experiments described show that the photosynthetic activity of the leaves of tomato and cucumber plants grown in artificial light was lower than that of plants grown in natural light in the greenhouse or outdoors. Tables and charts recording the rate of CO_2 assimilation by plants grown under different sources and intensities of illumination and in different CO_2 concentrations are given.

528. NEISWANDER, R. B.
Pollination of greenhouse tomatoes by honey bees.
J. econ. Ent., 1956, **49**: 436-7, bibl. 2.

In experiments on both spring and autumn crops, bee pollination of tomato plants in the greenhouse proved less effective than the use of an electrical vibrator; a combination of the two gave the highest yields.—Ohio agric. Exp. Stat., Wooster.

529. RANDHAWA, G. S.
Development of the parthenocarpic tomato fruits.
Indian J. Hort., 1956, **13**: 20-3, bibl. 12, illus.

Cytological examination showed that fruits developing from emasculated flowers as a result of treatment with β-naphthoxyacetic acid were parthenocarpic. In the initial stages young parthenocarpic fruits made more rapid growth than pollinated fruits. Hormone sprays did not inhibit embryo development after fertilization had occurred.

530. JOHNSON, S. P.
Influence of growth regulators on setting of tomato fruits: a concept.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 365-8, bibl. 16.

An attempt is made to define the causes of unfruitfulness in tomatoes in specific terms and to suggest how growth substances are able to reverse these effects and hence increase fruit set. The problem is discussed under 4 headings: (1) The factors which contribute to unfruitfulness; (2) the physiological basis for unfruitfulness; (3) the mode of action of the growth regulator; and (4) when to apply growth regulators.—Tex. agric. Exp. Stat., College Station.

531. MUKHERJEE, K. L., AND KUMAR, K.
Growth and yield responses of tomato and onion to the application of indole-3-acetic acid (I.A.A.).
Sci. and Cult., 1956, **22**: 112-14, bibl. 10.

Soil applications of IAA to tomato and onion plants had no beneficial effect on growth and the higher concentrations had a toxic effect.—Banaras Hindu Univ.

532. JAKUŠKINA, N. I.
The effect of growth substances on phosphorus metabolism in tomatoes. [Russian.]
Doklady Akad. Nauk, S.S.S.R., 1956, **109**: 635-7, bibl. 8.

When tomatoes were sprayed with 2,4-D at 15 mg./l. during flowering the P metabolism was found to be affected; notably the phosphorylase activity was increased in both ovaries and leaves. The spraying caused changes in respiration, increasing that of the ovaries and reducing that in the leaves. It appears therefore that the phosphorylase becomes associated in the ovaries with synthesis and in the leaves with dissociation. The changes seem to be the result of an increased flow of plastic substances from the leaves into the ovaries.

533. Zanardi, D.
Sintomatologia delle alterazioni indotte dal dal 2,4-D su piante di peperone. **(Symptomatology of changes induced by 2,4-D in capsicum plants.)** [English summary 3 lines.]
Ann. Sper. agrar., 1956, **10**: 1663-75, bibl. 9, illus.

Capsicum plants accidentally sprayed with a 6 p.p.m. solution of 2,4-D developed dwarfed and deformed leaves from the terminal buds. There was a marked abortion of flower buds and malformation of fruit. The symptoms were reproduced with slightly less severity in a later variety experimentally treated.

534. Anon.
Weathered ash answers best for ring culture.
Grower, 1956, **46**: 641-5, illus.

Weathered boiler ash appeared to be the cheapest and most effective aggregate for tomato ring culture at Boots Experimental Station, Lenton, Nottingham.

535. Reeve, E., and others.
Influence of crop rotations and fertilizer treatment on tomato yields.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 350-4, bibl. 7.

Tomato yields were essentially doubled by two years of deep-rooted legumes (alfalfa and sweet clover) in a four-year rotation, as compared with rotations involving only tomatoes and onion sets or continuous tomatoes. Likewise, one year of sweet clover in a rotation with tomatoes and onion sets substantially increased tomato yields. Rotations with tomatoes, onion sets, carrots, sugar beets, and/or red clover also increased tomato yields, but the increases were not as large as those from rotations with deep-rooted legumes. The fertilizer treatments used on all rotations were adequate to maintain the fertility level of the soil unchanged. In general, tomato yields were increased by fertilizer treatment. [From authors' summary.]—Campbell Soup Co., W. Chicago, Ill.

536. Inden, T.
On the physiology of the roots of vegetable crops. IV. Effects of oxygen pressure in the soil atmosphere on the growth and uptake of nutrients in tomatoes, cucumbers and egg-plants. [Japanese, with English summary $\frac{2}{3}$ p.]
J. hort. Ass. Japan, 1956, **25**: 85-93, bibl. 29, illus.

Tomato plants died when the soil was aerated with [gas] mixtures containing 2% oxygen. When oxygen pressure was low the petioles wilted and adventitious roots were produced on the stem. No significant differences in tomato growth were observed on soils with 10% oxygen and 20% oxygen. Cucumber and egg-plants did not die in soils with low oxygen contents. Cucumber growth was greatest on the 20% oxygen soil. Egg-plant growth was similar on 10% and 20% oxygen soils, although leaf growth was greater on soils aerated with the 10% oxygen mixture. Leaf N concentrations in all 3 crops were lower at lower soil oxygen levels. In cucumbers and egg-plants N concentrations in the stem were increased with increasing soil oxygen, but the opposite effect was observed in tomato plants. Phosphate and K concentrations increased with increasing oxygen tension in the soil. [For parts I and III see *H.A.*, 23: 3008 and 4148.]

537. Ozaki, C. T., and others.
Soil fertility investigations under field and greenhouse conditions.
A.R. Fla agric. Exp. Stats, 1955, pp. 258-60, illus.

In an N, P, K experiment quality of capsicums was reduced at the highest level of N. Both N and K_2O at high levels caused fruit injury. Plants treated with low K_2O had necrotic spots on leaves. Increasing K_2O at the 120 lb. N level decreased the greenness of plants. Potash produced a significant increase in plant height. The P content of fruit and leaves increased with P_2O_5 application levels; the N content of fruits and leaves increased with N application levels, but increasing the K_2O application level significantly decreased the leaf N percentage. Stem and leaf assimilation of Mg and Ca was reduced by increasing the level of K_2O applied. [See also *H.A.*, 26: 1835 and 2859.]

538. Butters, R. E.
Feeding for quality raises tomato returns.
Grower, 1956, **46**: 1175-8, bibl. 2.

Trials on liquid feeding for tomatoes have been carried out over several years at Fernhurst Research Station. When nutrients were given at every watering to Potentate grown in raised beds, fruit quality (based on amount of blotchy ripening) was significantly improved, but yields were about 1 lb. per plant lower than from plants fed at alternate waterings. In the "every-watering" treatment the soil pC values were low. When the pC value was kept above 3·00, feeding at every watering improved quality without yield reduction. There were indications that improved quality was not due to any one nutrient but to a general increase in soluble salt concentration. The variety Ware Cross was used in later experiments. By adding sodium sulphate to the feed at alternate waterings quality was improved without yield reduction. Further trials under commercial conditions have confirmed these results. The financial gain from extra feeding was worth while in these experiments.

539. Mori, H., and Abe, I.
Studies on the nitrogen nutrition of tomato plants. I. Effects of various nitrogen levels of nutrient solution in water culture on the absorption of N, P, K, on growth and on fruiting behaviour. [Japanese, with English summary $\frac{2}{3}$ p.]
J. hort. Ass. Japan, 1956, **25**: 69-76, bibl. 18, illus.

Marglobe tomato plants were grown in nutrient solutions with 4 levels of N, and with P, K, Ca, Mg and S in varied or constant proportions to N. At the 50, 100 and 200 p.p.m. levels of N, absorption increased until the 3rd truss was about to flower, after which only slight variations in absorption were apparent. At 400 p.p.m. N absorption was rapid in the early part of the season and continued until early August when it started to decrease. Absorption processes of P and K were similar to that for N, except that at high N and low K absorption of K increased until late July when rapidly decreased. The amounts of N and P absorbed increased with increased levels of these nutrients but other nutrients had no effect on N and P absorption. Potassium absorption was dependent on the K level with 200 p.p.m. N, but was reduced at 400 p.p.m. N, particularly with 80 p.p.m. K. Absorption of water was proportional to the variation of atmospheric temperature. Growth and fruiting of the plants were normal under all treatments.

540. Corrales Macedo, A., and Júarez Galiano, L.
Fertilización nitrogenada foliar como complemento a la fertilización con guano de islas, en el tomate. **(Foliar application of nitrogen as a supplement to soil application of guano for tomatoes.)**
Inf. Estac. exp. agríc. La Molina, 1955, **29**(334): 19-22.

Corrales Macedo, A.
Fertilización foliar nitrogenada del tomate como complemento de la fertilización con guano de islas. **(Foliar application of nitrogen to tomatoes as a supplement to soil application of guano.)**
Inf. Estac. exp. agríc. La Molina, 1956, **30**(344): 14-20.

There was a slight, but not significant yield increase from spraying before and during flowering and during fruit ripening with Nu Green totalling 30 kg. of N per ha. where the plants had already received N at 70 kg. per ha. as guano. There was a slight, but not significant reduction of yield where part of the total 70 kg. of N was supplied as Nu Green instead of the whole as guano. The experiment is to be repeated with modified fractional applications of Nu Green.

541. Shaw, D. A., and Hilton, R. J.
Leaf feeding of determinate tomato plants. II. Effects of urea and sucrose sprays under field conditions.
Canad. J. agric. Sci., 1956, **36**: 401-7, bibl. 10.

Field trials were conducted to assess the influence on determinate tomato plants of urea and sucrose foliar sprays, applied separately and in equi-molar combination. Under field conditions in central Alberta leaf-burning usually followed urea spraying. This was most severe during dull days with high relative humidity and was mitigated by the addition of sucrose to the spray. The sucrose appeared to reduce the initial rate of urea absorption and to prolong the absorption period. The C/N ratio in leaves was temporarily narrowed after spraying with urea, owing to significant increase in leaf nitrogen occurring 2 to 3 days after treatment. Effects of treatments on vegetation and reproduction were slight and without statistical significance. [Authors' abstract.]—Univ. Alberta, Edmonton. [For part I see *H.A.*, 26: 2844.]

542. La Rotonda, C.
Concimazione potassica e caratteristiche mercantili del pomodoro industriale. **(The effect of potassium as a fertilizer on market quality of tomatoes for processing.)** [German, French, English and Spanish summaries ½ p. each.]
Paps annu. Mtg Bd tech. Advis. int. Potash Inst., being *Potassium Symposium 1955*, pp. 433-7.

Low yields and high acid content of tomatoes grown on slightly acid soils manured with high N, little P and no K were remedied by the application of balanced NPK fertilizers, in spite of assertions by some authors that potassium sulphate increased fruit acidity.

543. Dobroljubskij, O. K., and Živickaja, L. I.
Foliar nutrition of eggplant with microelements. [Russian.]
Sad i Ogorod, 1956, No. 8, pp. 24-6.

Eggplants sprayed with 0·5% and 0·05% zinc sulphate and 0·005% cobalt sulphate 15 days after planting produced 11, 70 and 57% more buds respectively than those sprayed with water. The 0·5% $ZnSO_4$ treatment, especially when followed by light rains, had a very favourable after-effect, resulting in a lower total number of fruits but more large mature fruits than were produced by the 2 other treatments. Applications of 0·05% $ZnSO_4$ and 0·005% $CoSO_4$ were about equally effective. Yields on the control plot amounted to 55 cwt. and on the treated plots 69–72 cwt. per ha., where in addition maturity was advanced by 5–6 days.

544. McIlrath, W. J., and Palser, B. F.
Responses of tomato, turnip and cotton to variations in boron nutrition. I. Physiological responses.
Palser, B. F., and McIlrath, W. J.
II. Anatomical responses.
Bot. Gaz., 1956, **118**: 43-52, bibl. 15, illus.; 53-71, bibl. 23, illus.

The plants were grown in sand culture with major nutrients, Mn, Zn, Cu, Fe and Mo. In the 3rd and 4th weeks B was supplied to one series at 5 p.p.m., the rest continuing without B. In the 5th and following weeks differential treatments were carried out in both series as follows: (1) no additional treatment, (2) spraying with 10% aqueous sucrose containing 5 p.p.m. of B, (3) spraying with the sucrose only. Plants lacking B developed typical deficiency symptoms, including necrosis of meristem in the terminal shoot of tomato. Sugar sprays slightly improved the growth of B-deficient plants increasing total foliar carbohydrates in tomato. In both tomato and turnip sugar-B sprays largely, but not completely, compensated for initial lack of B as regards growth and foliar B content, but with continuous B supply the addition of sugar tended to reduce growth. Unsprayed turnip leaves had a lower total sugar and higher starch percentage where B was deficient than where it was adequate, whereas in tomato B deficiency reduced foliar starch without significantly affecting total foliar sugar. Carbohydrates in the roots of tomato and turnip were reduced by B deficiency, a probable result of phloem necrosis. Anatomical effects of the deficiency in both plants included hypertrophy, necrosis and hyperplasia of cambium and phloem and occasionally of xylem parenchyma. Sugar-B spraying had little effect on anatomy in these plants.—Dep. Bot., Univ. Chicago.

545. KALRA, G. S.
Responses of the tomato plant to calcium deficiency.
Bot. Gaz., 1956, **118**: 18-37, bibl. 43, illus.

Calcium levels of 0, 40, 80 and 160 p.p.m. were established in sand cultures and 0 and 160 p.p.m. in water cultures. Tomato plants grown at 0 p.p.m. developed typical deficiency symptoms, but when transferred to solutions with 160 p.p.m. Ca growth and leaf production, which had been limited, increased. The cell/nucleus size ratio was inversely related to Ca supply and decreased within 4 hr. of increasing the supply to deficient plants. The ratio of floral to vegetative apices and the development of flower buds were greater at 40 than at 160 p.p.m. Total cross-sectional area and percentage stelar tissue in internodes and hypocotyls were positively correlated with Ca levels. With few exceptions percentage dry weight was increased by Ca deficiency. In shoot apices the critical level of Ca for prevention of cell necrosis was 0·16–0·17% of dry weight; the value for internodes appeared to be lower.

546. SPENCER, E. L., AND GERALDSON, C. M.
Symptoms of nutritional disorders of vegetable crop plants.
A.R. Fla agric. Exp. Stats, 1955, pp. 267-70, illus.
GERALDSON, C. M.
Controlling blossom-end rot of tomatoes.
Market Grs' J., 1956, **85**(8): 12-13, 22, illus.

Blossom-end rot was successfully controlled by spray applications of a 0·04 molar (approx. 4 lb. per 100 gal.) calcium chloride solution. The best results were obtained by application coinciding with a deficiency, usually temporary, of soil calcium. Spray injury was generally minimized by spraying the younger portions of the plants and decreasing the rate and quantity as the season progressed. Excessive Mg accentuated the Ca deficiency. [See also *H.A.*, 26: 2842.]

547. STOUT, P. R., JOHNSON, C. M., AND BROYER, T. C.
Chlorine in plant nutrition.
Calif. Agric., 1956, **10**(9): 10.

Chlorine deficiency in tomato plants was characterized by leaf chlorosis followed by necrosis. Growth was restricted and plants did not set fruit. The substitution of bromine for chlorine in the nutrient solution partially delayed the appearance of deficiency symptoms.

548. WEBER, A.
Magnesiummangel. I. Forsøg og undersøgelser med tomat, selleri og kartoffel m.m. 1948–53. (**Magnesium deficiency. I. Experimental studies with tomato, celeriac, potato and other crops, 1948-53.**) [English summary 1¾ pp.]
Tidsskr. Planteavl, 1955, **58**: 421-62, illus.
STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Idem.
Tidsskr. Planteavl, 1956, **60**: 361-4, illus.

In an experimental field at Lyngby that had received only NKP fertilizers since 1920, symptoms of magnesium deficiency were first observed in tomatoes in 1946. In subsequent tests of curative treatments the best results, as regards leaf symptoms, fruit quality and total yields, were obtained from 5 foliar applications of 5% magnesium sulphate between the beginning of June and the middle of August, the application of a 5% magnesium sulphate solution to the soil at the rate of 1,000 kg. per a. proving somewhat less effective. Celeriac was another crop that responded with deficiency symptoms to a low soil Mg content. Foliar and ground applications of Mg caused the symptoms to disappear but failed to improve yields. With Cox's Orange apples 5 foliar applications of 2% magnesium sulphate at 10–15 days' interval from the 7th June onwards greatly reduced leaf spot and defoliation.—The second paper is a summary of the first.

549. HEWITT, E. J., AND MCCREADY, C. C.
Molybdenum as a plant nutrient. VII. The effects of different molybdenum and nitrogen supplies on yields and composition of tomato plants grown in sand culture.
J. hort. Sci., 1956, **31**: 284-90, bibl. 12.

Fuller details are given of work previously reported briefly [*H.A.*, 24: 3929]. Where tomatoes were grown without Mo acute symptoms of Mo deficiency developed only in plants receiving N in the forms of nitrate or ammonium nitrate. Plants supplied with N as nitrite, ammonium nitrite, ammonium sulphate, urea or glutamic acid showed no symptoms or only slight symptoms. In all N treatments Mo deficiency decreased yields and the concentrations of ascorbic and dehydroascorbic acid in the leaves. Except where N was supplied as urea or glutamic acid Mo deficiency also significantly decreased plant dry matter percentages. The chlorophyll content was significantly decreased by Mo deficiency only in plants receiving nitrate or ammonium nitrate; in Mo-deficient plants receiving ammonium sulphate it was significantly increased. In Mo-deficient plants receiving nitrate or ammonium nitrate nitrate accumulated in amounts ranging from 4·75 to 7·29% dry matter; in Mo-deficient plants receiving other forms of N and in all plants supplied with Mo nitrate contents did not differ significantly, the range being 0·67 to 1·60% dry matter. These results are discussed in relation to those from similar experiments carried out with cauliflowers [*H.A.*, 25: 3931 and 3932 and earlier].—A.R.C. Unit Plant Nutrit., Long Ashton Res. Stat.

550. ROMANO, E.
Misure di umidità del terreno nella irrigazione a pioggia. (**Measurement of soil moisture under sprinkler irrigation.**) [English summary 8 lines.]
Ann. Sper. agrar., 1956, **10**: 1217-61, bibl. 15.

A detailed study was made of moisture distribution at different soil depths during the irrigation period on sandy and alluvial soil under different crops, including tomatoes.

551. HAROLDSEN, E. O. (HAMSON, A. R.).
How to double tomato yields.
Amer. Veg. Gr, 1956, **4**(6): 16, illus.

Experiments have shown that an irrigation programme of 8 applications which maintained a high soil moisture content resulted in the highest tomato yields. In-eased total yields were also obtained by application a starter solution of 10–52–17 fertilizer at transanting.—Utah St. agric. Coll.

552. Nicolaisen, W., and Fritz, D.
Untersuchungen über den Wasserverbrauch von Tomaten bei verschiedenen Wachstumsbedingungen. I. **(Studies on the water economy of tomatoes under different growth conditions. I.)**
Gartenbauwiss, 1955, **2**: 414-26, bibl. 2, illus.

omatoes were grown in a standard compost in pots the open, in a block of tomato houses or in a cucumr house. The environmental effect on growth and velopment was largely one of temperature. The uicker growth rates under glass were accompanied by creased water consumption; climate also affected elds under glass. In the open the average amount water used in 4 years' studies was 286 l./kg. dry eight and in the cucumber house it was 416 l./kg. y weight.—Inst. Gemüsebau, Tech. Hochsch., annover.

53. Kern, H.
Der Einfluss des Lycomarasmin-Kupfer-Komplexes auf den Wasserhaushalt abgeschnittener Tomatensprosse. **(The effect of lycomarasmin-copper complex on the water status of cut tomato shoots.)** [English summary 7 lines.]
Phytopath. Z., 1956, **27**: 55-9, bibl. 5.

hen lycomarasmin is applied to tomato shoots as copper-complex, it is no longer able to chelate Fe d transport it to the leaves. Fe toxicity is therefore oided and excessive transpiration, which is caused by e lycomarasmin, does not occur.—Inst. spez. Bot., ig. tech. Hochsch., Zürich. [See also *H.A.*, 26: 4.]

54. Stanton, D. J.
Effect of steam and of soil disinfectants on yield and quality of Nelson glasshouse tomatoes.
N.Z. J. Sci. Tech., Sect. A, 1956, **38**: 66-77, bibl. 4.

13 seasons' trials soil treatment by steam has sulted in improved tomato growth and fruit yields, ich in some cases was twice that in unsterilized ts with the same manurial treatment. Chloropicrin ne and chloropicrin mixed with DD was the most ective fumigant tested, and yield and quality of matoes were equal to those on steam-treated plots. lorobromopropene or DD (used alone) gave satistory results in the first season of the tests, but high elds were not maintained by the continued use of these migants on the same plots. Formalin and Sterizal d not prove satisfactory for the treatment of glassuse soil in these trials.—Cawthron Inst., Nelson.

55. Milinkó, I.
Vizsgálatok és védekezési kísérletek a paradicsom vírusbetegségeinek leküzdésére. **(Experiments to control virus diseases in tomatoes.)** [Russian and English summaries 1 p. each.]
Növénytermelés, 1956, **5**: 165-76, bibl. 17, illus.

In field tests plots which has been mechanically infected with virus up to 93·8% showed a 30% drop in yield. Virus-infected fruits showed decreases of 31% in dry matter, 25% in sugar content and 36% in vitamin C content compared with normal fruits. The aucuba strain of tobacco mosaic was found to attack the seed surface, and the infection was persistent for up to 400 days. Seed treatment with NaOH for virus inactivation was tested and treatment with a 1·5–2% solution was found to be the most effective. No harmful effect on the seed was observed, even after a month's storage, and in some cases the treatment was observed to be stimulating. Virus-infected seeds, when treated and sown under sterile conditions, produced normal plants. With untreated diseased seeds, virus transmission up to 33% was observed.

556. Gualaccini, F.
Trasmissibilita del virus producente il mosaico del peperone, mediante la *Cuscuta*, e prove di identificazione di esso. **(Transmissibility by *Cuscuta* of the virus producing capsicum mosaic, and tests for its identification.)** [English summary ⅓ p.]
Boll. Staz. Pat. veg. Roma, 1955 (issued 1956), **13**: 79-101, bibl. 21, illus.

The virus was transmitted by *Cuscuta pentagona* from infected plants of capsicum to *Nicotiana glutinosa*, to one variety of tobacco and to tomato and beet. It was retransmitted mechanically from tobacco to capsicum and is probably a strain of tobacco mosaic virus.

557. Boelema, B. H., and Gelderblom, J. P. B.
Blights and bacterial spot of tomatoes. Control in Middle- and Highveld of Transvaal.
Fmg S. Afr., 1956, **32**: 15-18, bibl. 3, illus.

The symptoms caused by *Septoria lycopersici*, *Phytophthora infestans* and *Xanthomonas vesicatoria* are briefly described. Several control sprays have been tested at the Horticultural Research Station, Pretoria, and recommendations are given.

558. Newhook, F. J., and Davison, R. M.
Incorporation of fungicides in fruit-setting sprays for control of *Botrytis* fruit rot in glasshouse tomatoes. I. Introduction and screening trials.
N.Z. J. Sci. Tech. Sect. A, 1956, **38**: 166-76, bibl. 1, illus.

B. cinerea frequently becomes established on flower petals of glasshouse tomatoes sprayed with fruit-setting growth substances. Infection then enters the fruits causing severe losses. A laboratory method was developed to assess the ability of *B. cinerea* to establish on and penetrate dead petals after spraying with mixtures of growth substance and fungicides. Materials based on ferbam, thiram and ziram, at 2–3 times the normally recommended strengths, gave almost complete control in laboratory tests and tests on pot-grown tomato plants. None of the systemic fungicides tested proved satisfactory.—Plant Dis. Div. and Fruit Res. Stat., D.S.I.R., Auckland.

J.R.L.

559. Davison, R. M., and Newhook, F. J.
Incorporation of fungicides in fruit-setting spray for control of *Botrytis* fruit rot in glasshouse tomatoes. II. Compatibility of mixtures.
N.Z. J. Sci. Tech. Sect. A, 1956, **38**: 177-9, bibl. 2.

Tests [over three seasons] to ascertain the compatibility of various fungicides with fruit-setting chemicals have been carried out on pot-grown tomatoes. Addition of ferbam 0·28–0·42%, thiram 0·3%, ziram 0·3%, captan 0·2% and dichlone 0·05% to β-naphthoxyacetic acid sprays had no adverse effect on size, number, yield or quality of fruit. Similar results were obtained in a single trial in which the first four were added to sprays containing parachlorophenoxyacetic acid. Copper derivative of 8-quinolinol 0·1% and 0·2% seriously reduced fruit size, yield and quality. Ferbam 0·56% and dichlone 0·1% when added to β-naphthoxyacetic acid reduced yields and fruit size in the first truss of one experiment. [Authors' summary.]—Fruit Res. Stat. and Plant Dis. Div., D.S.I.R., Auckland.

560. Newhook, F. J., and Davison, R. M.
Incorporation of fungicides in fruit-setting sprays for control of *Botrytis* fruit rot in glasshouse tomatoes. III. Tests in commercial houses.
N.Z. J. Sci. Tech. Sect. A, 1956, **38**: 180-3, bibl. 5.

Experiments under commercial growing conditions were carried out on winter and spring tomato crops to control the fruit rot that follows establishment of *Botrytis cinerea* on dead petals. It was shown that to secure maximum protection truss sprays should be applied in such a way that each flower receives at least two applications of fungicide, the first in a combination spray of growth substance and fungicide, the second in a spray of fungicide alone 7 to 12 days after setting. The results showed that the latter can be supplied either by special truss sprays or by overall sprays for *Botrytis* control. Overall sprays did not satisfactorily replace inclusion of fungicides in growth substance sprays. Ferbam 0·35% and thiram 0·3% gave best control in combined sprays. [Authors' summary.]—Plant Dis. Div. and Fruit Res. Stat., D.S.I.R., Auckland.

561. Brook, P. J.
Spray experiments to control *Botrytis cinerea* on tomatoes.
N.Z. J. Sci. Tech., Sect. A, 1956, **38**: 124-8, bibl. 2.

Of fungicides tested against *Botrytis cinerea* on glasshouse tomatoes, thiram gave the most satisfactory control. Applied fortnightly, 0·1% and 0·2% concentrations were equally effective in reducing infection and increasing fruit yield. [Author's summary.]—Plant Dis. Div., D.S.I.R., Auckland.

562. Cox, R. S., and Hayslip, N. C.
Progress in the control of gray mold of tomato in south Florida.
Plant Dis. Reptr, 1956, **40**: 718-26, bibl. 2, illus.

In repeated experiments dichlone and ferbam gave effective control of grey mould (*Botrytis cinerea*) on tomato foliage. Vancide 51, Tennam and thiram gave excellent control in 1 experiment. Repeated sprays of nabam (plus metal salts) resulted in increased grey mould on stems, leaves and fruits; this effect was offset by the inclusion of dichlone in the nabam-sulphate mixture, but phytotoxicity was increased. Tennam caused slight and Vancide 51 caused moderate foliar injury. In plots sprayed with Dithane D-14 plus zinc sulphate, Terraclor, Tennam or Vancide 51 significant yield reductions were observed. Fruit rots were significantly higher in 3 of the 4 nabam-metal salt treatments than in the controls. Control of *Rhizoctonia* fruit rot was also obtained by several of the materials.—Everglades Exp. Stat., and Indian River Field Lab., Univ. Florida.

563. Phillips, D. H.
Tomato seed transmission of *Didymella lycopersici* Kleb.
Trans. Brit. mycol. Soc., 1956, **39**: 319-29, bibl. 23.

The results of tests and field experiments suggest that an infection or contamination of tomato seed with *Didymella lycopersici* is rarely important as a source of stem rot in the crop. An account is given of the disease as it affects outdoor tomatoes in Jersey.—States' exp. Stat., Jersey.

564. Phillips, D. H.
Soil-borne infection of tomatoes by *Didymella lycopersici* Kleb.
Trans. Brit. mycol. Soc., 1956, **39**: 330-40, bibl. 13.

From his experiments with potted plants and in the field the author concluded "that if the remains of a crop attacked by *D. lycopersici* are ploughed in, and tomatoes are grown on the land in the following season, *Didymella* stem rot is likely to be severe in the new crop, especially if (as sometimes happens in Jersey) the ploughing-in is left until spring. On the other hand, if the diseased crop residues are removed from the field at the end of the season, the fungal inoculum is greatly reduced by the time the next year's crop is planted, and the danger of disease may then be much decreased."—States' exp. Stat., Jersey.

565. Garofalo, F.
Sull'avvizzimento delle piante di *Solanum melongena* L. in Piemonte. **(The wilting of eggplants in Piedmont.)** [English summary 6 lines.]
Ann. Sper. agrar., 1956, **10**: 1383-1400, bibl. 16, illus.

Eggplants were attacked by wilt disease at any stage of their development and the damage spread to all parts of the plant. High humidity of atmosphere and soil were favourable to the disease. Examination of many diseased specimens led to the conclusion that *Fusarium oxysporum*, *F. moniliforme* and *F. scirpi* var. *caudatum* were causal agents.

566. Wilson, J. D.
Comparative control of buckeye rot of tomato by various fungicides.
Phytopathology, 1956, **46**: 511-12, bibl. 6.

Buckeye rot of tomato (caused by *Phytophthora* spp.) occurs only sporadically in Ohio. In an experimental lanting of tomatoes being sprayed for the control f anthracnose fruit rot at Wooster in 1955, the best control of buckeye rot was furnished by captan, followed by maneb. Ziram gave very poor control, but when half of it was replaced with a fixed copper n a tank-mix formulation markedly increased control f the disease resulted. A tank-mix formulation of maneb was much less effective than was a wettable powder preparation. The varieties Pennhart, Bounty and Jefferson were much more susceptible to infection than were Jubilee, Victor and Sioux. [Author's summary.]—Ohio agric. Exp. Stat., Wooster.

567. Treggi, G.
Attacchi di *Sclerotium rolfsii* Sacc. su colture di pomodoro e di peperone. **(Attacks of *Sclerotium rolfsii* on tomato and capsicum.)** [English summary ¾ p.]
Ann. Sper. agrar., 1956, **10**: 1553-74, bibl. 10, illus.

nvestigations in northern Italy showed that the fungus developed most vigorously at 30°–33° C. Other conditions favourable to it were soil of light texture, soil humidity approximately 50% of capacity and the presence in the soil of 20% of farmyard manure and % of soluble starch. Of many modern fungicides tested the best results were given by quinone compounds and organic compounds of mercury.

568. Bickley, W. E., Harrison, F. P., and Ditman, L. P.
***Drosophila* as a pest of canning tomatoes.**
J. econ. Ent., 1956, **49**: 417-18, bibl. 3.

Baskets of tomatoes were sprayed with malathion and ilan, and both reduced oviposition of *Drosophila* without tainting the fruit. Pyrethrum sprays applied o baskets of tomatoes as they were loaded into trucks n the field greatly reduced *Drosophila* oviposition. Butoxy polypropylene glycol was found to be an effective repellent to the flies.

569. Gould, H. J.
Damage to tomato roots by BHC.
Plant Path., 1956, **5**: 105, illus.

Watering with a proprietary BHC emulsion at 0·04% BHC caused stunted growth and reduced root systems n potted Stonor's Moneymaker tomato plants; root ymptoms were less marked on Potentate. Root ystems were only slightly reduced after treatment with amma-BHC.—N.A.A.S., Wye, Kent.

570. Streef, G. M.
Arbeidsfysiologisch onderzoek bij het tomatenplukken. **(Physiological investigation on manual labour in tomato picking.)** [English summary 14 lines.]
Landbouwk. Tijdschr., 1956, **68**: 795-807, bibl. 7, illus.

he energy requirement for tomato picking was found o be about 3 work calories per minute. The increase n pulse rate during picking was greater than in 2 other ypes of labour with the same energy expenditure. Higher temperatures in the greenhouse resulted in a arger excess pulse rate during work; higher yields meant a lower energy expenditure. No influence of luster height on energy expenditure or working pulse ate was observed.—Lab. fys. Dieren, Wageningen.

571. Nettles, V. F., Dennison, R. A., and Hall, C. B.
Post-harvest effects of temperature, light, storage atmosphere and humidity on tomato quality.
A.R. Fla agric. Exp. Stats, 1955, pp. 115-16.

A better colour was developed in mature-green tomato fruits ripened at 70° F. under a light intensity of 150 foot candles for 2 to 24 hours per day than in those ripened in the dark [see also *H.A.*, 26: 707]. The highest colour values were obtained in fruit ripened under unfiltered and red-filtered light. Better colour was obtained from fruits ripened at an initial temperature of 60° F. than from fruits ripened at 40° F. No definite effect on firmness of fruit could be consistently attributed to ripening treatment.

Sundry.

572. Clos, E. C.
Nueva hortaliza para el païs: "*Heleocharis dulcis*". **(A new vegetable for Argentina: *Eleocharis dulcis*.)**
Idia, 1956, No. 100, pp. 23-4, bibl. 3.

The Chinese water chestnut has been tested for introduction into Argentina. The percentages of water, protein, fats, nitrogen-free extract, fibre and ash of the tubers are compared with those of potato, *Stachys sieboldii*, artichoke, yam and taro. Tubers should be planted 10 cm. deep and 60 cm. apart in soil of pH 6·9–7·3 and flooded when the plants are 20–25 cm. high with a depth of 10–12 cm. of water. Average yields are 9,000–18,000 kg. per ha. in China and 28,000 kg. in the U.S.A.

573. Singh, S., and Saini, B. S.
New acaricides for the control of the vegetable mite—*Tetranychus telarius* Linn. (*Acarina: Tetranychidae*).
Indian J. Hort., 1956, **13**: 30-5, bibl. 2.

Akar 338 and Aramite W.15 have given about 86% mite mortality in 3 replicated experiments on *Abelmoschus esculentus*.—Agric. Coll., Ludhiana, Punjab.

574. Portilla, A.
La quinua. **(Quinoa.)**
Rev. Fac. Med. Bogotá, 1955, **23**(4): 178-89, from abstract *Biol. Abstr. Sect. D*, 1956, Vol. 30, No. 11, abstr. 32526.

A description of the plant *Chenopodium quinoa* which grows well especially in the high regions of Southern Colombia and Ecuador. The leaves are used as salad or like spinach and the seeds are also edible. It is said to be of great nutritional value.

575. Šutić, D.
Prilog proučavanju bakterioze na čičku. **(A contribution to the study of bacteriosis on *Arctium lappa*.)** [English summary 1¼ pp.]
Zasht. Bilja, 1956, No. 33, pp. 27-34, bibl. 12.

A new bacterial disease caused by *Bacterium nigromaculans* syn. *Pseudomonas n.* has recently been observed on edible burdock, *A. lappa*, in Yugoslavia.

Noted.

576.

a ABAD MANRIQUE, J. B.
El cloro-hipoclorito cálcico como estimulante de la germinación. **(Calcium chlorohypochlorite as a germination stimulant.)**
Farmacognosia, 1949, **9**: 13-38, bibl. 5 [received 1956].
Germination of tomato seeds and subsequent root and shoot growth were stimulated.

b ADSUAR, J.
A report on two species of tomato resistant to the tomato disease known as "tisis" in Puerto Rico.
J. Agric. Univ. P.R., 1956, **40**: 127-8, bibl. 2.
Lycopersicum peruvianum var. *dentatum* and *L. glandulosum.*

c ANDEWEG, J. M.
The breeding of scab-resistant frame cucumbers in the Netherlands.
Euphytica, 1956, **5**: 185-95, bibl. 11, illus.

d ANON.
Improved paste tomato.
Agric. Res. Wash., 1956, **5**(2): 12, illus.
Roma.

e BERG, W.
Die Blumenkohl-Minierfliege, ein wenig beachteter Schädling. **(*Phytomyza rufipes*, a lesser pest of cauliflower.)**
Reprinted from *Rhein. Mschr. Obstb.*, 1956, No. 5, pp. 2, bibl. 2, illus.
Biology and control.

f BOCANEGRA SALAZAR, S.
Variedad mejorada de frijol Canario para la costa central del Perú. **(An improved Canario variety of French bean for the central coast of Peru.)**
Inf. mens. Estac. exp. agric. La Molina, 1955, **29**(338): 14-16.
More productive and resistant to anthracnose.

g CAMPBELL, J. A.
Contender leads all bean varieties in Station tests.
Miss. Fm Res., 1956, **19**(1): 3.
In earliness and cropping.

h CROCOMO, O. J., AND SALIBE, A. A.
Conteúdo em calcio, proteina e vitamina C em doze variedades de couve (*Brassica oleracea*). I. **(Calcium, protein and vitamin C contents of twelve varieties of cabbage. I.)** [English abstract 4 lines.]
Rev. Agric. Piracicaba, 1956, **31**: 113-28, bibl. 13.
Only the Ca content is reported on here. This varied from 1·350% to 1·925%.

i DEPARTMENT OF AGRICULTURE FOR SCOTLAND.
Tomato foot rot diseases.
Adv. Leafl. Dep. Agric. Scot. **16**, revised 1956, pp. 6, illus.
Symptoms and prevention of soil-borne diseases caused by *Phytophthora*, *Pythium*, *Colletotrichum* and *Rhizoctonia* spp.

j DEUTSCH, M.
Szárazbabfajtáink. **(Dry bean varieties.)**
Agrártudomány, 1955, No. 5, pp. 199-202, from abstr. in *Hung. agric. Rev.*, 1956, **5**(1): 8.
In Hungary.

k DOBSON, R. M.
A note on the relative abundance of flea beetles (*Phyllotreta* Stephens and *Psylliodes* Berthold) on different cruciferous crops.
J. hort. Sci., 1956, **31**: 291-4, bibl. 6.

l DROZD, A. M.
Experiments on breeding and seed production of vegetables. [Russian.]
Agrobiologija, 1956, No. 2, pp. 11-16.
Tomato, pea and cucumber.

m D'EMMEREZ DE CHARMOY, A.
La culture de l'oignon. **(The culture of onions.)**
Rev. agric. sucr. Maurice, 1956, **35**: 145-8.
In Mauritius.

n EMMERT, E. M.
The magic of plastic mulches.
Amer. Veg. Gr, 1956, **4**(6): 11, 28, 34-5, illus.
See *H.A.*, 26: 2748.

o GALLEGLY, M. E.
Progress in breeding for resistance to clubroot of broccoli and cauliflower.
From abstr. in *Phytopathology*, 1956, **46**: 467.

p GALLO, G.
Cocomeri e meloni. **(Water-melons and melons.)**
Ital. agric., 1956, **93**: 692-5, illus.
The types grown in Italy.

q GARCIA, G. M.
A preliminary study of the production of cauliflower seed.
Philipp. J. Agric., 1954 (issued 1956), **19**: 143-52, bibl. 6.

r JENSEN, J.
Sortsforsøg med skalaerter 1953–55. **(Variety trials with green peas, 1953-55.)** [English summary 1 p.]
Tidsskr. Planteavl, 1956, **60**: 321-40.
Twelve round-seeded varieties tested at the 4 State Research Stations.

s KAGAWA, A.
Studies on the effect of low temperature induction in radish plants. Part I. Studies on the transmission of the thermo-inducing stimulus and the effect of removing the cotyledons upon flower induction in Japanese radishes. [Japanese, with English summary ¼ p.]
Bull. nat. Inst. agric. Sci. Hiratsuka, Ser. E, 1955, No. 4, pp. 265-80, bibl. 43, illus.

t KEFFORD, R. O., AND JONES, J. R. D.
Onion seed production.
J. Agric. Vict., 1956, **54**: 297-303, illus.
Growing of certified onion seed in Australia.

u LAMBERT, E. B.
Mushroom growing in the United States.
Fmrs' Bull. U.S. Dep. Agric. **1875**, revised 1955, pp. 12, illus.

v LEAR, B.
Results of laboratory experiments with Vapam for control of nematodes.
Plant Dis. Reptr, 1956, **40**: 847-52.
Meloidogyne incognita var. *acrita* eradicated; tomatoes used as test plants.

w LEBEN, C., AND KEITT, G. W.
Phytotoxicity of antimycin A.
Antibiot. and Chemother., 1956, **6**(3): 191-3, illus.
To tomatoes, radishes, beans, etc. [For abstract see *Rev. appl. Mycol.*, 1956, **35**: 625.]

MILES, M.
Observations on the emergence periods, larval populations and parasitism of the cabbage root fly (*Erioischia brassicae* Bché).
Ann. appl. Biol., 1956, **44**: 492-8, bibl. 9.

PETRÓCZI, I.
A fűszerpaprika gyűrűsfoltosságát előidéző mozaik-virusok Magyarországon. **(Ring spot of capsicum caused by mosaic viruses in Hungary.)** [Russian and English summaries ¾ p. each.]
Növénytermelés, 1956, **5**: 87-94, bibl. 8, illus.
Tobacco, cucumber and lucerne mosaics are considered to be responsible for 3 types of ring spot symptoms in capsicums.

z REED, L. B.
Insects and diseases of vegetables in the home garden.
Home Gdn Bull. U.S.D.A. **46**, 1956 (revised), pp. 48, illus.

77.

a ROHLOFF, I.
Möglichkeiten der Anwendung von Orthocid 50 bei der Keimprüfung. **(The possibility of using Orthocide 50 in germination tests.)**
Saatgut-Wirtsch., 1956, **8**: 235-6, bibl. 4, illus.
Pea germination was improved by using Orthocide 50.

b ROLL-HANSEN, J., AND WEYDAHL, E.
Statens forsøksgård Kvithamar. **(Kvithamar Research Station, Norway.)**
Gartneryrket, 1956, **46**: 649-50, illus.
Brief notes on vegetable varieties tested there.

c SCHALLER, A.
Über den Einfluss des Blanchierens auf den Vitamin C-Gehalt von Tiefkühlspinat. **(The effect of blanching on the vitamin C content of deep-frozen spinach.)** [English, French and Spanish summaries 4–5 lines each.]
Mitt. Klosterneuberg, Ser. B., 1956, **6**: 249-62, bibl. 62.

d SCHUPHAN, W.
La valeur nutritive des différents légumes-feuilles et sa variation en fonction des variétés et des conditions écologiques. **(The nutritive value of different leafy vegetables, and the variation due to variety and ecological conditions.)**
Reprinted from *Ann. Nutrit. Aliment.*, 1955, **9**: A67-A91, bibl. 23, illus.
Spinach, brassicas, lettuce and turnip greens.

e SCOTT, L. E., MATTHEWS, W. A., AND STARK, F. C.
Mineral composition and uptake of a rye cover crop under differential fertilizer treatment.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 344-9, bibl. 4.
Grown as a winter green manure in vegetable rotations.

f SEMAL, J.
Transmission par pucerons de *Cucumis virus I. var. Chr.* Noordam de céleri à céleri. **(Aphid transmission of *Cucumis virus I var. Chr.* Noordam from celery to celery.)** [English summary 3 lines.]
Parasitica, 1956, **12**: 71-3, bibl. 8.
Transmitted by *Myzus persicae* but not by *M. ascalonicus* or *Aphis gossypii.*

g SHIBUTANI, S., AND OKAMURA, T.
On the mode of colouring in various kinds of coloured turnips. II. Survey of the anthocyanins of coloured turnip. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1956, **25**: 111-15, bibl. 14.

h SINGH, H. B., AND JUNEJA, S. L.
Chuckandar is a first-rate vegetable.
Indian Fmg, 1956, **6**(4): 24-5, 44, illus.
Beetroot growing in India.

i SKVORCOVA, N. T.
Leaf ontogenesis and comparative-anatomical characteristics of 9 tomato varieties. [Russian.]
Bot. Zurnal, 1956, **41**: 389-93, bibl. 9, illus.

j STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Forsøg med sorter af tomater i vaeksthus, 1953–54. **(Variety trials with glasshouse tomatoes, 1953-54.)**
Tidsskr. Planteavl, 1956, **60**: 357-60.

k SYNGE, R. L. M., AND WOOD, J. C.
(+)-(*S*-Methyl-l-cysteine *S*-oxide) in cabbage.
Biochem. J., 1956, **64**: 252-9, bibl. 51.
A new amino acid occurring free in cabbage.

l TURCHI, A.
Contributo allo studio di nuove varietà di pomodoro. (**Contribution to the study of new varieties of tomato.**)
Riv. Ortoflorofruttic. ital., 1956, **40**: 334-43, illus.
Fruit characteristics are given for 20 varieties.

m TURNER, E. R., AND QUARTLEY, C. E.
Studies in the respiratory and carbohydrate metabolism of plant tissues. VIII. An inhibition of respiration in peas induced by 'oxygen poisoning'.
J. exp. Bot., 1956, **7**: 362-71, bibl. 33.

n VAN DER VLIET, M.
Bestrijding van de aspergevlieg. (**Control of the asparagus fly.**) [English summary $\frac{1}{3}$ p.]
Meded. Dir. Tuinb., 1956, **19**: 774-9, illus.
Control regulations for *Platyparaea poeciloptera* in Limburg [Holland].

o WAGGONER, P. E., AND DIMOND, A. E.
Polyphenol oxidases and substrates in potato and tomato stems.
Phytopathology, 1956, **46**: 495-7, bibl. 8.
Studied in relation to vascular discoloration associated with wilt.

p WALTER, J. M.
Hereditary resistance to tobacco-mosaic virus in tomato.
Phytopathology, 1956, **46**: 513-16, bibl. 11, illus.

q WALTER, J. M.
Combination of resistances to tobacco-etch and tobacco-mosaic viruses in tomato breeding stocks.
Phytopathology, 1956, **46**: 517-19, bibl. 4, illus.

r WEINMANN, I.
Untersuchungen zur Samendiagnostik von *Brassica*-Arten und -Sorten unter besonderer Berücksichtigung chemisch-physikalischer Methoden. (**Studies on the identification of seeds of *Brassica* species and varieties, with special reference to chemico-physical methods.**)
Reprinted from *Z. Pflanzenz.*, 1956, **36**: 1-30, bibl. 53.

TOBACCO.

General.

(*See also* 10, 54, 617b, d-g, m, p, s, 974, 986, 995.)

578. C.S.I.R.O., AUSTRALIA.
Tobacco investigations.
A.R. C.S.I.R.O., Aust., 1954/55, 1955, pp. 26-7.

Frenching: In greenhouse experiments frenching developed more quickly when tobacco followed other crops. It was shown that a frenching factor can be concentrated by centrifuging soil filtrates and by chemical flocculation. Soil treatment with a vanadium compound controlled and sometimes prevented frenching. *Self- and total shading:* Comparative studies on shade patterns in east-west and north-south rows indicated considerable differences in shading patterns throughout the day between the 2 aspects, and these effects were accentuated in plants receiving high N. *Development of amenenic leaf in tobacco:* This leaf has low hexose carbohydrate food reserves and a high N content relative to sugar content. Adequate light and control of nutrient N are necessary for normal leaf development.

579. STINSON, F. A., AND OTHERS. (TOBACCO RESEARCH BOARD OF RHODESIA AND NYASALAND.)
Report of progress 1953-1955.
Bull. Tobacco Res. Bd Rhod. Nyasaland 5, 1956, pp. 48, illus.

Work is reported on: *Seedbeds:* Sterilization with methyl bromide 48 hours before sowing is described; applied after seeding a mulch of 9 in.-long grass has provided a satisfactory cover and reduced anthracnose. *Crop rotations and cropping systems:* Yields of tobacco grown after 2 seasons of weeping love-grass (*Eragrostis curvula*) were outstanding, with a low root-knot nematode index; ploughing to 9 in. has given higher yields and lower root-knot infection than shallower ploughing. *Varietal improvement:* Delcrest 63, Hicks 148, White Mammoth 75, White Stem Orinoco 183, Jamaica Wrapper 12, Bonanza 1 and Yellow Mammoth 25 have been found to give satisfactory yields of good quality when properly fertilized and managed. *Fertilization:* Flue-cured tobacco gets most of its N requirement from the soil, more being available after a green crop than in virgin land and after ploughing in February to 9 in. than after ploughing later and to only 4 in. Seedlings can use fertilizer most efficiently when it is placed in bands near their roots; split fertilizer applications are not generally recommended. *Transplanting:* Early transplants get more soil nutrients than late transplants; watering before setting has given good results, and the addition of an insecticide is an effective insurance against whitegrubs and false wireworms. *Field practices:* Transplanting on to fairly low broad ridges, later increasing their size and height with cultivation, has proved beneficial. Chlorobromopropene has successfully controlled witchweed (*Striga gesnerioides*). Topping when about 1 in 10 plants had produced flowers gave a bright coloured leaf of high quality; de-suckering has been accomplished effectively using an oil emulsion, followed by hand suckering. *Turkish tobacco:* In seedbeds satisfactory results have been obtained from a pre-sowing application of a 4–14–4 fertilizer at 6–10 lb./30 sq. yd.; more seedlings were obtained when the beds were mulched with long grass. In the field a spacing of

3×9 in. gave high yields of good quality leaf; higher ian normal rates of P and K applied before translanting improved quality and yield. *Other investiations:* These include curing procedure and bulking nd grading.

580. Nyasaland.
Tobacco.
A.R. Nyasaland Dep. Agric. 1954/55, Part II, 1956, pp. 61-7.

ark sun/air cured tobacco: In a trial at Chitedze two orms of farmyard manure gave significant increases yield and grade index; the method of placement did ot affect the response. When cropping started 4 days after topping yield and quality were increased. *urley tobacco:* Stand Upright continued to give romising results in variety trials. In a fertilizer trial ield and grade index were significantly increased by pplications of 300 lb./acre sulphate of ammonia and y 150 lb./acre superphosphate. *Flue-cured tobacco:* arly planting increased yield and grade index and 4–18–15 fertilizer increased yields at Lisasadzi. ormal growth of tobacco was obtained following crop of bulrush millet grown as a green manure, nd of 10 fertilizer treatments applied two, which ncluded a side-dressing, gave the highest value per cre.

Seed bed management.

(*See also* 617o.)

581. Garmany, H. F. M.
Grass mulching of seedbeds saves time and money.
Rhod. Tobacco, 1956, No. 13, pp. 6-7.

seed-beds mulched with grass tobacco germinated a rate of 112 seedlings per sq. ft., whereas under atching grass frames the figure was 78. Among pes of material tested fine vlei grass, lovegrass, odes grass, hay, chopped thatching grass and coarse nd all gave good results, as long as an adequate mount of material was evenly distributed. Grass gths of 6–9 in. were found to be better than shorter gths which tended to pack.

582. Addis, I. S.
Grower's view of mulching.
Rhod. Tobacco, 1956, No. 13, pp. 6-7.

e germination of tobacco under a mulch of vlei wire ass chopped into 1½- to 2-in. lengths was not satisctory. Mulching seedbeds with a thin covering of ver sand gave excellent results.

83. Daulton, R. A. C.
Nematode and weed control in tobacco seedbeds.
Rhod. Tobacco, 1956, No. 13, pp. 4-5.

il fumigants studied at Kutsaga included methyl omide (applied at rates between ½ and 2 lb. per 0 sq. ft.), ethylene dibromide (EDB), and some wly-introduced chemicals (applied at recommended tes). Tobacco germination was markedly suppressed N.244 and also by CBP-55. Methyl bromide (at termediate rates), EDB, V-C 13 and steam treatents resulted in higher stands of seedlings. Steam d all rates of methyl bromide successfully controlled eds and grasses. Only partial weed control was obtained with EDB, CBM, V-C 13 and Vapam. Treatment with ECB appeared to increase weed incidence. All chemicals reduced root-knot infection and most resulted in complete control. Practical recommendations for methyl bromide fumigation are given.

584. Todd, F. A., and Clayton, E. E.
Chemical treatments for the control of weeds and diseases in tobacco plant beds.
Tech. Bull. N.C. agric. Exp. Stat. **119**, 1956, pp. 23, bibl. 4, illus.

Experiments have been carried out since 1940 to obtain information on the effectiveness of various chemical soil treatments. The best disease control, based on the number of plants produced, was obtained with a mixture of urea and cyanamide (35·5 plants per sq. ft.) and methyl bromide (32 plants) compared with 14·5 plants per sq. ft. for untreated controls. Hand weeding in the control plots cost 3 times as much as in the treated plots. On heavier soils or where there is a heavy infestation of the root knot nematode methyl bromide is expected to be the more effective.

J.R.L.

585. Todd, F. A., and Lucas, G. B.
Treatment of tobacco plant bed soils with methyl bromide.
Bull. N.C. agric. Exp. Stat. **399**, 1956, pp. 20, bibl. 12, illus.

Over a 5-year period methyl bromide was tested at numerous locations in North Carolina for the control of soil-borne diseases and weeds in tobacco plant beds. The tests showed: 1. At the rate of 9 lb. per 100 sq. yd. it gave excellent control of black shank, root knot and weeds. 2. The overall cost of producing transplants on treated beds is as low as any other method now in use. 3. The gas is effective at soil temperatures as low as 50° F. 4. If the soil is too wet the gas does not penetrate, and the treatment is ineffective. 5. January treatments are as effective as fall treatments. 6. Any cover support, which does not have sharp or rough edges and which holds the cover at least two inches above the ground, is satisfactory. 7. The gas is effective when released at 1, 3, or 9 points of application per 100 sq. yd. of bed. 8. No adverse effects were noticed on plots sown 1 hour after the cover was removed. 9. The control of black shank in the plant bed does not appear to be of critical importance, if a resistant variety is grown. [From authors' summary.]

586. D.S.I.R., New Zealand.
Tobacco research.
A.R. D.S.I.R., N.Z., 1955-56, 1956, p. 17.

Trials were carried out on tobacco seedlings to test their reaction to several insecticides and fungicides. The seedlings were very sensitive to lindane, and leaf distortion occurred with slight variations from the recommended application. Phygon caused some delay in development, but parathion, malathion, dieldrin and Pestox appeared to be quite safe.

587. Bhat, N. R., and Awatramani, N. A.
Are tobacco seedlings malformed by insecticides suitable for planting?
Indian Tobacco, 1956, 6: 99-101, illus.

When 1-month-old tobacco plants were treated with Gammexane [BHC] 0·5% dust or DDT 50% W.P., both applied as pastes to the buds, the first few leaves to develop from the treated buds were malformed, but the upper leaves developed normally. Control plants and plants sprayed with DDT 50% W.P. at 12 lb./100 gal. water per acre showed no malformation.—Cent. Tob. Res. Inst., Rajahmudry.

Cultivation, nutrition and irrigation.

(*See also* 45, 57, 617a, q.)

588. Wilson, R. W.
Methods and tools for tobacco cultivation.
Bull. N.C. agric. Exp. Stat. **397**, 1956, pp. 15, illus.

This bulletin consists of two parts. The first, dealing with the effects of cultivation, summarizes the results of experiments reported in detail earlier [*H.A.*, 26: 2869]. The second discusses and illustrates methods of cultivation with particular reference to rotary hoes and to 'layby' implements used in the final earthing-up operation. In an experiment on the use of a rotary hoe cultivator the damage suffered by young plants was no greater than that done by hand hoeing. Used at this early stage it also had little effect on the spread of mosaic disease, but used a fortnight later it resulted in a substantial increase in the number of infected plants. The use of the rotary hoe resulted in large savings in man-hours.

589. Myers, J. M., Clark, F., and Harris, H. C.
Fertilization and culture of flue-cured tobacco.
A.R. Fla agric. Exp. Stats, 1955, pp. 40-2, 54-5.

Plant population-fertilizer-irrigation experiments [*H.A.*, 26: 1861] were continued. The highest net returns were produced from 7,500–10,000 plants per acre given one split application of 4–8–12 fertilizer, with a medium rate of irrigation. In 1955 the combination of mineral and organic fertilizers gave slightly lower yields than all-mineral fertilizers in fumigated plots, and slightly higher yields in non-fumigated plots. Effective sucker control was obtained with MH using 6–7 pints per acre.

590. Terman, G. L., and Seatz, L. F.
Crop response to metaphosphate fertilizers.
Proc. Soil Sci. Soc. Amer., 1956, **20**: 375-8, bibl. 10.

For tobacco on acid to neutral soils calcium metaphosphate compared favourably with concentrated superphosphate, but was slightly inferior for vegetables. On acid soils their effects were enhanced equally by liming. Trials with these P compounds and with potassium metaphosphate on various field crops are also reported.

591. Grimaldi, A.
Disponibilità potassica del terreno e qualità dei tabacchi. (**Availability of soil potassium and the quality of tobacco.**) [German, French, English and Spanish summaries 1¼ p. each.]
Paps annu. Mtg Bd tech. Advis. int. Potash Inst., being *Potassium Symposium 1955*, pp. 439-53, bibl. 22.

A marked improvement in leaf quality in the main tobacco area of Italy can be largely attributed to the adoption of a fertilizer programme consisting of 1·5 cwt. per acre of potassium sulphate, 0·8 cwt. of ammonium nitrate and the same quantity of basic slag, although the soils already contain good or high amounts of K. Applied K was correlated with foliar K, and exchangeable soil K with combustibility. High K was associated with increased hygroscopicity of the leaf and with increased soluble-N percentage in dried leaves.

592. Hutcheson, T. B., Jr., and Woltz, W. G.
Boron in the fertilization of flue-cured tobacco.
Tech. Bull. N.C. agric. Exp. Stat., **120**, 1956, pp. 23, bibl. 21, illus.

The results are summarized of 21 field experiments carried out over 4 seasons in which B from various sources and at various rates was applied to flue-cured tobacco growing on several soil types. Under very dry conditions as little as 0·3 lb. B per acre was sufficient to alleviate acute deficiency and to increase greatly the yield and value of cured leaves. The application of 0·9 lb./acre caused toxicity symptoms in some cases. The application of 1·2 lb./acre caused toxicity symptoms in all cases but did not affect the concentrations of nicotine, total N, sugar, CaO, MgO or K_2O in the cured leaves. In tobacco plants not receiving extra B the concentration of B in the leaves increased from the bottom of the plant upwards, but this trend was reversed when 0·6 lb. or more B was applied per acre. For diagnostic purposes the bud leaves (leaves near the terminal bud about 4 in. long) would appear to offer the most reliable material for analysis, the critical level for B being 15 to 16 p.p.m. Similar conclusions are drawn from the results of greenhouse trials in which tobacco grown in sand culture received different amounts of B.

593. Aglibut, A. P., and Eusebio, J. A.
The influence of irrigation on the growth, yield, and size of leaves of a Virginia variety of tobacco.
Philipp. Agric., 1954, **38**: 87-104, bibl. 6, illus. [received 1956].

Plants of a Virginia tobacco variety each irrigated with 1·12 to 10·61 litres at intervals of 2–4 days made better growth and produced more leaves and a heavier crop of cured leaves than non-irrigated plants. Yields were higher when irrigations were frequent than when water was applied at longer intervals. The best yield of cured leaves was obtained when each plant received an average of 208·6 litres (224·6 ha./cm.) of water in addition to 12 centimetres of rainfall during growth Irrigations of 7·45 litres per plant given every 2 days produced the largest leaves, but more uniform leaves were obtained from plants that received 10·61 litres.

594. Jackson, W. T.
Flooding injury studied by approach-graft and split root system techniques.
Amer. J. Bot., 1956, **43**: 496-502, bibl. 10.

A study was made of the causes of reduced shoot growth and chlorosis of lower leaves of Marglobe tomato and Turkish tobacco plants following flooding of the root systems [see also *H.A.*, 26: 1818]. The alysis was conducted by the use of approach-grafted ants and plants with split-root systems. This per- tted subjecting one root system to flooding, while the oot also had available an unflooded root system, her through an approach-graft to another plant or rough another root system of the same plant. idence is presented which indicates that growing oots are dependent upon functional root systems for owth factors other than water and minerals. There no evidence at present concerning the nature of these tors. It is unlikely that a significant amount of luced shoot growth or chlorosis of lower leaves is e to a toxin produced in the flooded roots or in the ot environment. [Author's summary.]—Josiah llard Gibbs Lab., Yale Univ., New Haven, Conn.

5. Ciferri, R.
La morfologia fogliare del tabacco dal germinello alla pianta adulta. **(Foliar morphology of tobacco from the seedling to the full-grown plant.)** [English summary 4 lines.]
Tabacco, 1956, **60**: 233-6, bibl. 4.

anges in leaf morphology are described for White rley tobacco from the seedling to the juvenile and ture phases, with brief reference to corresponding tabolic changes.—Ist. bot. Univ. Pavia.

Growth, physiology and biochemistry.

(*See also* 36, 63, 66j, 617i, k.)

6. Scarascia, G. T.
Ricerche sugli effetti della radiazione in *Nicotiana*. 1. Azione dei neutroni termici sulla germinazione e lo sviluppo della *Nicotiana tabacum* L. **(Studies on the effects of radiation on *Nicotiana*. 1. Action of thermal neutrons on germination and development of *Nicotiana tabacum*.)** [English summary $\frac{3}{4}$ p.]
Tabacco, 1956, **60**: 249-67, bibl. 16, illus.

ds of 4 tobacco varieties were subjected to 3 different nsities of thermal neutrons. Seedling height was ced by $3{\cdot}6 \times 10^{13}$n/cm.^{2} and a dose 3 times as n was lethal. Germination was delayed by $1{\cdot}8 \times 10^{13}$ $3{\cdot}6 \times 10^{13}$n/cm.^{2} Other effects were chromosome aks, increased bud production, narrowing and rmity of leaves, and sometimes variegation.— Genet. Ist. sci. sper. Tab., Roma.

7. Scarascia, G. T., Scarascia-Venezian, M.E., and Giovannozzi-Sermanni, G.
Sull'invecchiamento del seme di *Nicotiana*. Osservazioni citologiche e biochimiche. **(The ageing of *Nicotiana* seed. Cytological and biochemical observations.)** [English summary 7 lines.]
Tabacco, 1956, **60**: 278-85, vivl. 14.

nges in enzymes, sugars, fats and amino acids are orted for seeds of *Nicotiana tabacum* and *N. rustica* different periods of storage. Germinating capacity ined steadily for 4 years and fell very sharply in 5th year. Abnormal chromosome behaviour eased as viability declined.—Lab. Genet. e Biochim., sci. sper. Tab., Roma. [See also *H.A.*, 26: 78.]

598. Scarascia-Venezian, M. E., and Giovannozzi-Sermanni, G.
Variazione biochimiche durante la germinazione del seme di *Nicotiana tabacum* L. e *Nicotiana rustica* L. **(Biochemical variations during seed germination in *Nicotiana tabacum* and *N. rustica*.)** [English summary $\frac{1}{2}$ p.]
Tabacco, 1956, **60**: 268-77, bibl. 5, illus.

An account is given of the enzymes, amino acids and sugars in dormant seeds, germinating seeds and young seedlings of *N. tabacum* and *N. rustica*.—Lab. Biochim. Ist. sci. sper. Tab., Roma.

599. Vickery, H. B., and Palmer, J. K.
The metabolism of the organic acids of tobacco leaves. XI. Effect of culture of excised leaves in solutions of glycolate at pH 3 to pH 6.
J. biol. Chem., 1956, **221**: 79-92, bibl. 25.

Fully developed leaves of the tobacco variety Connecticut shade-grown were excised and cultured in 0·2M solutions of potassium glucolate at 4 pH levels. Glycolic acid uptake increased with increase in pH from 3 to 4 to 5 but at pH6 was similar to that at pH5. At pH4 70% of the glycolic acid acquired in 48 hours was rapidly metabolized, and at pH5 and 6 this figure rose to nearly 90%. The main product of the metabolism was citric acid, but a moderate and nearly constant fraction of the acquired glycolic acid was oxidized to oxalic acid, and there were also small increases in succinic acid and certain other, so far unidentified acids.—Conn. agric. Exp. Stat., New Haven. [For part X see *H.A.*, 26: 2887.]

600. Mándy, G.
Dohányrendellenességek. **(Anomalies in tobacco.)**
Bot. Közl., 1955, No. 3/4, pp. 189-99, from abstr. in *Hung. agric. Rev.*, 1956, **5**(2): 5.

In the literature 35 growth abnormalities have been recorded in *Nicotiana tabacum*, 2 in *N. glauca* and 4 in *N. rustica*. The author observed 30 malformations, of which 16 were different from those already described.

Topping and desuckering.

(*See also* 617r.)

601. Anon.
Nouveaux essais sur l'inhibition des bourgeons. **(New tests on bud inhibition.)**
Rev. int. Tabacs, 1956, **31**: 157, 160.

In growers' trials in 1955 maleic hydrazide and mineral oil effectively inhibited suckering in tobacco, but were in some cases phytotoxic. Satisfactory results were obtained with vegetable oils when conditions for treatment were favourable. At the Institute at Bergerac a local, non-edible nut oil has been tested. About 1 c.c. of oil was applied to the stem section with the 2 uppermost buds. The treatment did not inhibit all sucker growth but greatly reduced the time taken for desuckering. The oil was cheap and did not appear to affect the quality of the tobacco.

602. Raguini, J. R.
Alpha-naphthalene acetic acid to suppress suckers in decapitated tobacco plants.
Philipp. Agric., 1955, **38**: 536-9, bibl. 7 [received 1956].

One drop of NAA per plant applied to the cut made in topping checked sucker growth only slightly but delayed sucker formation. Plants which received 2–3 drops of NAA produced thicker, broader and coarser, but less gummy and hairy leaves. Two drops favoured rooting in the top 10 nodes and internodes. Three drops caused the leaves to droop 1 week after application. Chemical suckering was cheaper than hand suckering.

Climatic injury, diseases and pests.

(*See also* 617c, j, l, n, t, u, 797, 968.)

603. Kreutz, W.
Die Bedeutung des Windschutzes für den Tabakbau. **(The importance of wind protection for tobacco growing.)**
Dtsch. Tabakb., 1952, **32**(11): 93-5, from abstr. in *Bibl. deutsch. Wetterdienst.*, **4**, 1956, No. 574.

An improvement in both quality and quantity of tobacco grown in a sheltered experimental field was observed. Yields of cured tobacco were increased by 10% when the crop was protected. Leaf from protected plants was brighter, larger, finer and lower in nicotine than that from unprotected plants.

604. Morgan, O. D., Jr.
Host range studies on tobacco anthracnose caused by a species of *Colletotrichum*.
Plant Dis. Reptr, 1956, **40**: 908-15, bibl. 19, illus.

The *Colletotrichum* sp. causing anthracnose of tobacco in Maryland has been found to attack a wide range of weeds and crop plants. The latter include tomatoes, capsicums and lettuces, which some growers raise in or near to tobacco seed beds. The fungus has also been found growing on old plant debris.

605. Morgan, O. D.
Effects of antibiotics on *Colletotrichum* sp.—the cause of anthracnose of tobacco.
From abstr. in *Phytopathology*, 1956, **46**: 468.

In tests with 6 antibiotics more lesions were produced on leaves treated with 200 p.p.m. than on untreated checks, and the same concentration also resulted in heavier sporulation on potato-dextrose agar than occurred on untreated cultures. When higher concentrations of most of the antibiotics were applied to cultures the growth rate of the fungus decreased rapidly up to 400 p.p.m., then levelled out and finally increased again above 800 p.p.m. On plants higher concentrations up to 400 p.p.m. also reduced lesion formation, aureomycin giving the best control. Above 400 p.p.m. the plants were injured.

606. Lautz, W.
Efficacy of soil treatments with nine chemicals in tobacco black shank control.
Plant Dis. Reptr, 1956, **40**: 855-60, bibl. 6.

Samples of soil infested with *Phytophthora parasitica* var. *nicotianae* were each saturated with one of several solutions of 8 chemicals and with methyl bromide gas in experiments conducted during a 5-year period. This treated soil, as well as infested untreated soil and uninfested untreated soil, was put into 1-gal. glazed crocks. A tobacco plant of the variety 402 approximately 6 ins. high was transplanted into each of th crocks. Methyl bromide, applied at 1 lb. per 10 sq. ft., controlled black shank. Vapam (40% sodiu N-methyl dithiocarbamate dihydrate) at 1 gal. t 40 gal., nabam at 1/50, and formaldehyde at 1/25 wer effective as drenches for use in the control of blac shank. Treatments with some chemicals, includin sodium azide and urea, gave control in some year but not in others. [From author's abstract.]—Agric Res. Serv., U.S.D.A.

607. Thill, H.
The control of damping off on tobacco with "Folidol E 605".
Höfchen Briefe (English edition), 1956, **9**: 112-16, bibl. 4, illus.

Young tobacco plants were watered 2 or 3 times afte transplanting with a solution of 0·1% Folidol E 60 to control damping-off caused by the nematod *Ditylenchus dipsaci*. In untreated plots nematod plots nematode infestation ranged from 72 to 100% whereas in blocks in which treatment was starte 1 or 2 weeks after planting out infestation was onl 4–7%. Three waterings did not give markedly bette results than 2 waterings. Delaying treatment unti 3 weeks after transplanting increased the number o diseased plants considerably.—Regional Inst. Plan Prot., Bühl.

608. Heggestad, H. E., and Grosso, J. J.
Resistance of *Nicotiana knightiana* and other tobacco species to root-knot nematodes.
From abstr. in *Phytopathology*, 1956, **46**: 467.

Plants of 48 *Nicotiana* species were tested for resistanc to root-knot nematodes, notably *Meloidogyne incognit* var. *acrita*, and 32 species, including *N. occidentalis* proved relatively susceptible. *N. repanda* was the onl species to remain free of galls, but *N. knightiana* *N. arentsii*, *N. otophora* and *N. paniculata* showed high degree of resistance. A vigorous *N. tabacum*× *N. knightiana* hybrid has been raised and is bein tested for nematode resistance.

609. Dominick, C. B.
Control of hornworms and flea beetles on tobacco with endrin and TDE.
J. econ. Ent., 1956, **49**: 425-6, bibl. 2.

In field trials in Virginia endrin as a dust or spray gav a higher initial kill of hornworms (*Protoparce* spp than TDE, but after 2 days both materials were equa in effectiveness. TDE was less effective in controllin tobacco flea beetle (*Epitrix hirtipennis*).—Va agri Exp. Stat., Tob. Res. Stat., Chatham.

610. (Lawson, F. R.)
This stinging, paperhanging killer is the tobacco farmer's friend.
Agric. Res. Wash., 1956, **5**(1): 3, illus.

Nesting shelters have been built in an attempt t encourage the wasp *Polistes exclamans*, which predatory on tobacco hornworms and budworm There are indications that a sizeable wasp populatio can help to control moderate infestations of both pest

1. Scott, L. B.
The sugarcane beetle damages tobacco in Tennessee.
J. econ. Ent., 1956, **49**: 567.

etheola rugiceps was observed to attack tobacco dlings, apparently for the first time, in 1955. An lication of 20% toxaphene dust or disking in 2 rts per acre of 23% aldrin emulsion gave promising ntrol.

2. Cavalloro, R.
Su un nuovo collembolo dannoso al tabacco in semenzaio: *Seira ferrarii* Parona. (**A new collembolid pest of tobacco in seedbeds:** ***Seira ferrarii.***) [English summary 7 lines.]
Tabacco, 1956, **60**: 147-66, bibl. 47, illus.

species was not previously known to be harmful tobacco. Control was achieved by dusting or aying with nicotine insecticides, either 0·5% enicated extract of tobacco or 100 g. per hl. of eous nicotine sulphate containing 40% of the ive principle, in conjunction with soft soap. In eral chlorinated synthetic insecticides damaged the dlings, BHC and chlordane being particularly harm- but 10% DDT used as a 1% suspension was satis- tory. Evening was the best time for application.

3. Guthrie, F. E., and Rabb, R. L.
Broadcast treatments with insecticides and soil fumigation for tobacco wireworm control.
J. econ. Ent., 1956, **49**: 344-7, bibl. 8.

adcast applications of dieldrin, heptachlor and in gave excellent control of heavy infestations of cco wireworms, while chlordane, not tested ist heavy infestations, showed good results against erate infestations. Soil fumigation with DD and as practised for nematode control did not give factory control of wireworms.—N.C. St. Coll., igh.

Curing and fermentation.

(*See also* 617h.)

4. Sastry, A. S.
Studies with superimposed carbohydrates in the flue-curing of tobacco. Part I. Their effect on the chemical changes during flue-curing. Part II. Their effect on the yellowing of the leaf during flue-curing and its final quality.
Proc. Indian Acad. Sci. Sect. B, 1956, **44**: 148-61, bibl. 9, and 162-70, bibl. 27.

eriments were carried out, in which leaves of rrison's Special were stood with their bases in a glucose solution for 5 hours before being cured. er leaves were stood in water or left untreated. ailed chemical analyses were carried out on the es immediately after treatment, at the end of owing, at the end of fixing and at the end of curing. sugar-fed leaves contained more carbohydrates n the controls at the outset of curing, but protein tents remained unaltered. In one experiment both ted and control leaves contained sufficient carbo- rate to meet respiratory demands and the quan- s of ammonia-, amide- and amino-N formed ng yellowing were small. In a second experiment all the leaves contained less carbohydrate and protein hydrolysis resulted in the accumulation of large amounts of ammonia-, amide- and amino-N. Comparisons between these results and those reported earlier for high- and low-carbohydrate leaves [*H.A.*, 24: 557] showed the role of added carbohydrates to be similar to that of carbohydrates occurring naturally in the leaf. In these experiments and in others involving culturing in 5% sucrose the added carbohydrates resulted in better yellowing and grading of the leaves. A hypothesis is suggested to explain the role of carbohydrates in the yellowing process.—Cigar and Cheroot Tob. Res. Stat., Vedasandur.

615. McAuliffe, C., Markantonatos, A., and Weybrew, J. A.
Is aroma being lost?
Res. and Fmg N.C., 1956, **15**(Progr. Rep. No. 1): 4-5.

By using "heavy water" in an isotopic dilution technique it has been shown that flue cured tobacco loses between 0·4% and 4·7% of its volatile organic compounds during drying and rehydration.

J.R.L.

616. Verdura, R.
Trasformazioni chimiche che si verificano durante l'essiccamento e la fermentazione nei tabacchi sub-tropicali coltivati sotto garza. (**Chemical changes occurring during drying and fermentation of subtropical, shade-grown tobaccos.**) [English summary ½ p.]
Tabacco, 1956, **60**: 237-48, bibl. 8.

In the Sumatra Scafati 7 and Round Tip varieties grown in Italy drying produced rapid degradation of proteins and hydrolysis of soluble carbohydrates. Insoluble sugars were completely transformed, but starch was practically unaffected. The most important changes during fermentation were the reduction of nicotine and of alcohol- and ether-soluble substances.—Lab. Chim. agrar. Ist. sci. sper. Tab., Scafati.

Noted.

617.

a Anon.
Tobacco fertilization.
Fmg S. Afr., 1956, **32**(5): 52-3, 64, illus.
Recommendations for flue- and air-cured tobaccos on soils low and high in available P and K.

b Bhat, N. R., and Krishnamoorthi, T.
A male sterile mutant in *N. tabacum*.
Curr. Sci., 1956, **25**: 297-9, bibl. 3, illus.
And data on amount of natural cross pollination.

c Buzzell, A., Trkula, D., and Lauffer, M. A.
X-ray studies on tobacco mosaic virus.
Arch. Biochem. Biophys., 1956, **63**: 470-6, bibl. 30.
X-ray inactivation of TMV an all-or-none reaction [see also *H.A.*, 26: 2908f].

d Ditmer, W. P., and Lincoln, W. C., Jr.
Seed laboratory, a service to tobacco growers.
Res. in Rev., 1956, **5**(1): 3, illus.
A note on the Massachusetts State Seed Laboratory.

e Dorta, J.
Storia della tabacchicoltura in Italia. **(History of tobacco growing in Italy.)**
Agric. Venezie, 1956, **10**: 483-96.

f Gupta, P. S., Shukla, T. N., and Singh, I.
Cultivation of hookah tobacco (*Nicotiana rustica* L.) in Kannauj range of Uttar Pradesh—a survey.
Indian Tobacco, 1956, **6**: 67-73.
Acreages, rotations, culture and marketing.

g Hunter, H. S.
Tobacco leaf marketing in the United States of America.
Qd agric. J., 1956, **82**: 254-62.
Systems and grades.

h Izquierdo Tamayo, A.
Estudios sobre la flora bacteriana del tabaco. **(Studies on the bacterial flora of tobacco.)** [English and French summaries ¾ p. each.]
An. Inst. nac. Invest. agron. Madrid, 1956, **5**: 1-119+28 plates, bibl. 35.
Bacillus and *Micrococcus* activity during fermentation.

i Lumang, H., Fernandez, N., and Apon, C.
Progress report on the water-soluble reducing sugars and sucrose content of Virginia tobacco.
Philipp. J. Agric., 1954 (issued 1956), **19**: 173-8, bibl. 6.
Differences between 8 varieties and between localities were marked.

j Marcelli, E.
Note ed osservazioni sulla natura virosica del vederame. **(Notes and observations on the virus nature of tobacco green-spot disease.)** [English summary ¼ p.]
Tabacco, 1956, **60**: 212-32, bibl. 14, illus.
TMV confirmed as cause of green spot of cured leaves.

k Mihajlov, K.
A study of flavones of the polyphenol group in tobacco by paper chromatography. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **108**: 511-14, bibl. 21.

l Mondoñedo, J. R.
Tobacco mosaic and its control.
Philipp. Agric., 1955, 39: 109-16, bibl. 23.
A review.

m Moore, E. L., and Drolsom, P. N.
An aberrant flavor in breeding lines of flue-cured tobacco.
Agron. J., 1956, **48**: 529-30, bibl. 3.
A cigar-like flavour in selections from the Hicks variety.

n Morgan, O. D.
Resistance in the F_1 progeny of cross var. Maryland Catterton × *Nicotiana sylvestris* and var. Maryland Robinson × *N. sylvestris* to tobacco anthracnose.
From abstr. in *Phytopathology*, 1956, **46**: 468-9.
About half the F_1 progeny showed moderate resistance similar to that of *N. sylvestris*.

o Pennsylvania College of Agriculture.
Tobacco seedbed management.
Circ. Pa agric. Ext. Serv. **462**, 1956, pp. 8.
Including soil sterilization, manuring and spray programmes.

p Puzzilli, M.
Sull'avvicendamento razionale, sulla scelta del terreno e sulla concimazione per il tabacco Kentucky. **(Rational rotation, choice of site and fertilizers for Kentucky tobacco.)**
Inf. agrar. 7 Apr., 1955, reprinted in *Tabacco*, 1956, **60**: 286-9.

q Puzzilli, M.
Sulle operazioni colturali necessarie per soddisfare le esigenze idriche del tabacco Kentucky. **(Cultural operations needed to satisfy the water requirements of Kentucky tobacco.)**
Inf. agrar. 16 June, 1955, reprinted in *Tabacco*, 1956, **60**: 289-91.
Weed control and irrigation discussed.

r Puzzilli, M.
Sulla cimatura del Kentucky. **(Topping of Kentucky tobacco.)**
Inf. agrar. 5 July, 1956, reprinted in *Tabacco*, 1956, **60**: 291-4.
Topping and subsequent removal of buds and basal leaves discussed.

s Raeber, J. G.
Seed production by the Tobacco Research Board.
Rhod. Tobacco, 1956, No. 13, p. 12.

t Siegel, A., Wildman, S. G., and Ginoza, W.
Sensitivity to ultra-violet light of infectious tobacco mosaic nucleic acid.
Nature, 1956, **178**: 1117-18, bibl. 7.
Reasons advanced for different degrees of inactivation shown by 2 strains [see also *H.A.*, 26: 2908r].

u Todd, F. A.
Mosaic control in tobacco.
Ext. Folder N.C. agric. Ext. Serv. **128**, 1956, 1 folded sheet, illus.
Symptoms, sources of infection and resistant varieties.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Culinary and spice plants.

(*See also* 669a, x, 670c, o, 967.)

618. Sastry, L. V. L., Srinivasan, M., and Subrahmanyan, V.
Saffron (*Crocus sativus* Linn.).
J. sci. industr. Res., India, 1955, **14A**: 178-84, bibl. 56.

affron, the dried stigma of the flowers of *Crocus tivus*, is used as a condiment and also medicinally. s chemical composition, biological properties, standards of purity and adulterants are discussed. An nalysis of 2 samples from a local market is tabulated.

619. Mondoñedo, J. R., and others.
Propagation of vanilla by cuttings.
Philipp. Agric., 1955, **39**: 393-401, bibl. 5, illus.

anilla cuttings were successfully stored, wrapped in anana bracts, for 3 weeks before planting. The best opagation results were obtained with cuttings metre long, inserted to only a quarter of their length nd provided with at least 50% shade. As a rooting edium soil gave better growth than a rice straw mulch a soil-straw mixture.

Drug plants.

(*See also* 628, 664, 669b, g, i, o-q, y, z, 670b, e, h-k, m, 963, 992.)

20. Dirlbek, J.
Alternariosa durmanů. (**Alternaria disease of *Datura* spp.**) [Russian, English and German summaries about 1 p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 537-50, bibl. 32, illus.

festation by *Alternaria crassa* of *Datura* species is ely to be severe after a period of more than 10 days ith average daily temperatures above 17° C. and lative humidities above 72%. Prevention of spread ay be obtained by prompt destruction of plant mains and by repeated sprays of 1% Kuprikol.

21. Kennard, W. C., and Morris, M. P.
Influence of cultural practices on tuber yields and sapogenin content of *Dioscorea floribunda*.
Agron. J., 1956, **48**: 485-7, bibl. 6, illus.

ants with vines growing on a chicken-wire trellis ve significantly higher yields of tubers than plants owing with vines on poles only, on living dwarf stor bean plants, or without support. These higher elds were obtained when plants were harvested after and after 2 years' growth in the field. An average crease of 360% in tuber yields occurred when plants ere grown for 2 years over plants harvested after year's growth in the field. Also, significantly higher osgenin percentages were found in tubers grown with equate vine support. Plants allowed to grow in the ld for 2 years, with vine support, gave calculated crude sapogenin yields up to 226 lb. per acre. [From authors' summary.]—Fed. Exp. Stat., Mayaguez, P.R.

622. Gómez Carcedo, F. S.
Una fructosana aislade de la raiz de genciana. (**A fructosan isolated from gentian root.**)
Farmacognosia, 1956, **16**: 143-82, bibl. 102, illus.

The organic composition of the root of *Gentiana lutea* is discussed and the isolation of inulin from it is described.

623. Mukerji, B.
Indian Rauwolfias and their place in therapy.
J. sci. industr. Res., India, 1955, **14A** (Suppl.): 1-33, bibls 7+33+154, illus.

In this review a list is given of 125 *Rauwolfia* species occurring throughout the world. Of those, however, only about a dozen are commonly available and *R. serpentina* is by far the most important. In an experimental cultivation of *R. serpentina* at Dehra Dun 2,000 lb. per acre of high quality roots were obtained in 2 years. The root characteristics of *R. serpentina*, *R. canescens*, *R. micrantha*, *R. densiflora* and *R. perakensis* are compared, and the alkaloids of *R. serpentina*, *R. canescens*, *R. caffra*, *R. vomitoria*, *R. obscura*, *R. semperflorens*, *R. natalensis* and *R. heterophylla* are listed and their chemistry and pharmacology discussed. [See also *H.A.*, 24: 4068t.]

624. Chandra, V.
Inducing rooting in stem cuttings of *Rauvolfia canescens* L.
Sci. and Cult., 1956, **22**: 101.

Hardwood cuttings of *Rauvolfia canescens* were treated with 30 p.p.m. of β-indolylacetic acid or α-naphthalene-acetic acid or with water for 12 hrs. before being planted in sand. After 3 months none of the water-treated controls had survived, whereas survival was 86·6% for IAA-treated plants and 60% for NAA-treated plants. The average number of roots per cutting was 6·06 and 4·07 for IAA and NAA respectively. Hormone treatment thus makes it possible to propagate *R. canescens* from hardwood cuttings.—Nat. bot. Gdns, Lucknow.

625. Sprecher, E.
Beiträge zur Frage der Biogenese sekundärer Pflanzenstoffe der Weinraute (*Ruta graveolens* L.). (**Biogenesis of secondary vegetable matter in rue.**)
Planta, 1956, **47**: 323-58, bibl. 150.

The important pharmacological compounds of rue and their biogenesis were studied. Histological, cytological and quantitative studies showed that volatile oil biosynthesis and growth were directly related. Rutin was formed from the start of germination; no flavonol was found in the seeds. The synthesis of flavone derivatives was virtually independent of growth, but was closely related to the exchange and accumulation of assimilates.—Bot. Inst., Tech. Hochsch., Karlsruhe.

Essential oils.

(*See also* 669c, n, x, 670d, f, 722, 838w.)

626. HILDEBRAND, R. P., AND SUTHERLAND, M.D.
An improved system for the collection of essential oils.
Chem. Ind. Lond., 1956, No. 32, pp. 828-9, bibl. 2, illus.

By modifying steam-injection leaf stills so that the aqueous layer in the oil separator is returned to the still improved yields of oil can be obtained without additional steam consumption. The apparatus, which is described with the aid of a diagram, proved its effectiveness in trials with leaves of *Agonis abnormis* and *Eucalyptus nova-angelica*.—Chem. Dep., Univ. Qd, Brisbane.

627. PILLAY, K. P.
Lemongrass—a big cash crop.
Indian Fmg, 1956, **6**(4): 31-5, illus.

Indian methods of lemongrass culture and oil extraction are described. The yield and chemical properties of the oil of the red and white lemongrass varieties are tabulated. In an experimental plot oil yields for the first 2 years averaged 1,570 ounces per acre per year. The waste grass after oil extraction is commonly used as a manure, but other possible uses for it are being investigated. The development of improved varieties and of better methods of distillation are also being studied.—Lemongrass Res. Stat., Odakkali, Travancore-Cochin.

628. GONZÁLEZ ALONSO, M.
Efectos de las deficiencias minerales sobre algunas plantas medicinales. **(Effects of mineral deficiencies on some medicinal plants.)**
Farmacognosia, 1955, **15**: 3-47, bibl. 32, illus.

Mint (*Mentha sativa*), peppermint (*Mentha piperita*), balm (*Melissa officinalis*) and fennel (*Foeniculum vulgare*) were grown in sand culture with nutrient solutions deficient in N, P, K, Ca or S. Of the plants tested mint was the most sensitive to deficiencies, followed by balm. Generally deficiencies increased the size of the epidermal cells, but in the case of peppermint the reverse was true. In all cases K deficiency increased essential oil content. With mint and peppermint, deficiency of nutrients other than K caused a decrease in the essential oil content, particularly in the stems. With fennel and balm almost all deficiencies caused an increase in essential oil content. Deficiency of P caused a reddish discoloration of balm, particularly on the lower surface of the leaves. Certain deficiency symptoms are illustrated in colour.

629. KAPOOR, L. D., AND OTHERS.
Cultivation of *Mentha arvensis* in Jammu and Kashmir.
J. sci. industr. Res., India, 1955, **14A**: 374-8, bibl. 5.

A brief botanical description is given of *Mentha arvensis*, introduced from Japan. The plants are propagated by rooted suckers in the spring, summer or autumn. Those planted in March in Jammu and irrigated, grew well and flowered in July, when the first crop was harvested. They flowered again in October, when the second flush was harvested. Th total yield of fresh herb was about 300–450 maunc per acre or about 75–110 md. of dry herb. The propo tion of stem to leaves was approximately 1 : 2. Fc distillation the leaves only should be used and yiel about 2% oil containing 70–80% menthol. Methoc of harvesting, drying and manuring are described an crops for rotation are suggested.

630. REITSEMA, R. H.
A new ketone from oil of *Mentha rotundifolia.*
J. Amer. chem. Soc., 1956, **78**: 5022-5, bibl. 7.

Over half the essential oil of *M. rotundifolia* has bee found to consist of an unusual terpene, for which th structure of 1,2-epoxypulegone (piperitenone oxide) proposed. This appears to be the same as the keton designated lippione isolated from oil of *Lippia turbinat* and as an aldehyde isolated from Indian spearmin *M. viridis*, which may or may not be synonymous wit *M. rotundifolia*. This new compound is of particula interest in view of the interesting properties exhibite by hybrids derived from crosses between *M. rotund folia* and other mint species.—Res. Lab. A.M. Tod Co., Kalamazoo, Mich.

631. HOTIN, A. A.
Phasic development of *Salvia sclarea.* [Russian.]
Agrobiologija, 1956, No. 2, pp. 125-9, illus.

Experiments conducted in Krasnodar in 1950–19 showed that for satisfactory flowering *Salvia sclar* in the seedling stage requires low temperatures and the flower bud induction stage long day condition On both chernozem and podzol soils the applicati of NPK improved growth, flowering and the yield essential oil.

Fibres.

(*See also* 28, 67k, 669f, k, 985.)

632. BÓCSA, I., AND BEKE, F.
Néhány külföldi kenderfajta hazai termesztési és nemesítési értéke. **(Growing and breeding value of some foreign hemp varieties in Hungary.)** [Russian and English summaries 1 p. each.]
Növénytermelés, 1956, **5**: 39-50, bibl. 5.

Four Turkish, 2 Chinese, 2 French, 1 Lebane 3 Russian, 2 East German and 1 Italian varieties a strains of hemp recently introduced into Hungary ha been evaluated for length of growing season, stalk a fibre yields and certain other characters.

633. KRUTIKOVA, L. P., AND LESIK, B. V.
Retting of hemp fibre with the use of bacterial ferments. [Russian.]
Doklady vsesojuz. Akad. selsjsk. Nauk, 1956, **21**(7): 30-5.

The addition of liquid or solid extracts of acti pectin-decomposing bacterial cultures was found intensify the development of these bacteria during t retting of hemp, and in consequence the time requir for the process was reduced. In semi-commerc trials extracts prepared on a liquid ramie medium fro cultures of *Clostridium felsineum* and from cultu

15 (obtained in retting *Abutilon*) with $NaHCO_3$ as
tralizer, reduced retting time by up to 60% with an
rage of 35%. Under conditions of warm retting
d extracts of *C. felsineum* on ramie and hemp media
ed to the permanent liquor of a commercial retting
nt reduced the processing time by 20–50%. The
effects of this method of retting on fibre quality
noted.

4. VELASCO, J. R., AND CABRERA, T. E.
The mineral nutrition of young abacá plants.
Philipp. Agric., 1956, **40**: 57-68, bibl. 2, illus.

kers of manila hemp raised from corms grown for
months in sand were grown in a series of nutrient
tions, using Hoagland's solution B as a control.
rogen-deficiency symptoms appeared within a few
ks, whereas definite symptoms of Ca and P defi-
cies were not induced during 10 months of treat-
nt. Symptoms of N, S and Mg deficiencies may be
d diagnostically in the field. Trunk and leaf
surements may help to diagnose K deficiency. In
-Cu culture the plants were larger than the controls
the first 7 months, after which the pseudostems
cumbed to a dry rot. Reactions to deficiencies of
e, Mn, Mo and Zn are also recorded. In mosaic
ulation studies plants with minor element defi-
cies were more susceptible than those with major
ent deficiencies.

. UMALI, D. L., BERNARDO, F. A., AND OCFEMIA, G. O.
Reaction of pacol-abacá F_1 hybrids to abacá mosaic and bunchy-top.
Philipp. Agric., 1956, **40**: 47-50, bibl. 5.

ids (*Aphis* and *Pentalonia* spp.) failed to transmit
cá mosaic and bunchy top viruses to F_1 seedlings
col (*Musa balbisiana*) × Maguindanao (*M. textilis*).

. CASTILLO, B. S., AGATI, J. A., AND OTANES, F. Q.
Studies on the rate of abacá mosaic spread under different conditions.
Philipp. J. Agric., 1954 (issued 1956), **19**: 257-74, bibl. 3, illus.

r a 12-month period the average monthly rates of
ad of the disease in 6-month-, 1-year-, 2-year-, and
ar-old plantations were 2·46, 3·77, 2·16 and 0·67%,
ectively. In plantations interplanted with maize
rate was 7·97%, in plantations sprayed 16 times
insecticides 0·91%, and in plantations, in which
ased plants were removed and replaced by healthy
s, 0·34%. Information is also given on other
ts found to be colonized by the vectors *Aphis*
dis and *A. gossypii* and on the effects of unfavourable
ther on aphid multiplication and on corresponding
eases in virus infection.

7. CRUZ, E. E.
Comparative study of mosaicked and non-mosaicked fibers of abacá.
Philipp. J. Agric., 1954 (issued 1956), **19**: 209-55, bibl. 25, illus.

ailed studies are reported on the physical and
mical properties of fibres from stems of the
guindanao variety taken from mosaic-diseased
ts, from apparently healthy plants in diseased stools and from healthy plants. The presence of the virus did not affect the percentage of fibre extracted, but reduced its tensile strength and increased its percentage of stretch. These effects, which are recorded separately for inner, middle and outer leaf sheaths, were related to differences in chemical composition.—Fiber Div., Manila.

638. CARANGAL, A. R., JR., CATAMBAY, A. M., AND MANZANILLA, E. B.
Biochemical studies on abacá mosaic virus and bunchy-top of abacá virus: II. The organic acids of abacá.
Philipp. Agric., 1955, **39**: 17-19, bibl. 5.

In roots, stems and leaves the main acid was oxalic followed by acetic. Small quantities of lactic or succinic acid were also present. Infection with mosaic virus did not cause abnormal metabolism of organic acids.

639. MENDIOLA-ELA, V., AND SAN JUAN, M. O.
Leaf spot and stem rot of abacá.
Philipp. Agric., 1954, **38**: 251-71, bibl. 12, illus. [received 1956].

The biology and symptoms caused by *Helminthosporium torulosum* on manila hemp are described. Infection may be reduced by field sanitation, timely harvesting of mature plots and ample spacing. In laboratory experiments the fungus did not grow on any medium containing Fermate [ferbam].

640. CRUZ, E. E., AND GARCIA, A. C.
Preliminary study on the application of defoliants on ramie plants.
Philipp. J. Agric., 1954 (issued 1956), **19**: 201-7, bibl. 2, illus.

Spraying with 3 chemicals resulted 5 days later in the following amounts of defoliation: (i) the cotton defoliant Penco De-fol-ate, 1 lb./1 gal. water, 80·68%; (ii) Pensalt Endothal Defoliant E-4069, 1 gal./15 gal. water, 54·41%; and (iii) Arama Defoliator, 1 gal./5 gal. paraffin, no defoliation. None of the treatments affected yield, strength or elasticity of the fibres.—Bur. Plant. Ind. centr. Exp. Stat., Manila.

641. ORTEZA, E. M.
Methods of propagating sansevieria.
Philipp. Agric., 1954, **38**: 392-7, bibl. 3, illus. [received 1956].

Root segments of *Sansevieria trifasciata* var. *laurentii* rooted earlier than suckers or leaf cuttings and produced a higher average percentage of suckers. The plants produced from root segments were also the tallest and had produced the highest average number of leaves 120 days after planting.

642. TANGANYIKA SISAL GROWERS' ASSOCIATION (LOCK, G. W., AND OTHERS).
Annual Report of the Sisal Research Station, Mlingano, Ngomeni, for the year 1955, 1956, pp. 21, illus.

Some of the results from extensive field and laboratory trials include: *Bulbil nurseries:* A spacing of 50 × 25 cm. resulted in the largest plants; sisal waste has proved an ideal manure and mulch for nurseries; plants raised from bulbils yielded more and were more uniform than plants raised from suckers. *Plant protection:* Spraying a new plantation with aldrin W.P. dust has given promising control of weevils (*Scyphophorus acupunctatus*). *Plant spacing:* Yields were positively and highly correlated with the number of plants per hectare except in plant densities of 5,000 per ha. or over during the second cycle. *Cultivation systems:* Intercropping with sorghum significantly reduced sisal yields. *Cutting methods:* Poling was more severe when cutting was lenient; the time of starting cutting and cutting cycles had little or no effect on fibre yields; heavy cutting reduced yields by 3–4 tons/ha.; heavy cutting at the premature stage onwards at half-yearly intervals greatly reduced plant size and yields. *Manurial trials:* Ground limestone significantly increased yields; both lime and N applications resulted in quicker returns; sisal receiving sisal waste grew faster than, and yielded twice as many leaves as, the control; no advantage was obtained by applying more K_2O than was necessary to correct vein-banding. *Herbicides:* The most successful chemicals were TCA, MCPA and 2,4-D, when used as pre-emergence sprays in nurseries and for preliminary checking of weed growth in double row sisal. *Plant physiology:* Symptoms of purple-leaf tip roll and tip die-back have occurred with restricted supplies of K, Ca and P; rooting was adversely affected by low Ca; high rates of Cu and Mo made new leaves chlorotic; high rates of B and Zn stunted growth and killed the root system; B deficiency was shown by yellow speckling and cracking of the epidermis; leaf analysis has shown that sisal waste increases the uptake of N, P, K and Ca.

Hops.

(*See also* 6701, p, 992, 995.)

643. WYE COLLEGE.
Annual Report Department of Hop Research for 1955, 1956, pp. 155, 5s.

In addition to the papers abstracted below this report contains reviews of the year's work in the various sections of the Department of Hop Research and a note on progressive verticillium wilt of hops at Wye College. The report also records the *Conference of the Scientific Commission of the European Hops Culture Committee* held at Wye in July, 1955. This includes a general account of the Conference by F. C. Thompson, a paper by R. A. Neve on "The place of polyploidy in hop breeding methods", and abstracts of the following: "Observations on some English varieties of hops grown in Belgium" by J. Hoed; "The uptake of mineral nutrients by the hop plant" by J. Hoed [see *H.A.*, 26: 837]; "Wood protection and wood protective substances in hop growing" by P. Janko; and "Recent research on hop drying" (with special reference to work at Wye) by G. A. Watson. J.R.L.

644. INSTITUTE OF BREWING HOPS ADVISORY COMMITTEE.
Institute of Brewing hop trials: 1954 crop.
J. Inst. Brew., 1956, **62**: 304-8.

A report is given of the physical characteristics and soft resin analyses of 6 wilt-tolerant hop varieties, namely, C2, D1, D3, J2, OT48 and V94. As in the previous year [*H.A.*, 26: 835] D3 possessed the most satisfactory brewing qualities, and it is suggested that it could be used in amounts equivalent to at least 25% of the normal hop grist. D1 and J2 also gave promising results, and OT48 proved more acceptable than in previous years. C2 and V94 were unsatisfactory.

645. FARRAR, R. F., NEVE, R. A., AND WESTON, E. W.
Inheritance of resin characters in hops.
A.R. Wye Coll., Dep. Hop Res., for 1955, 1956, pp. 52-9.

No significant correlations were found between the number of resin glands per flower of a male hop and the resin contents of cones from its female relatives, nor between the glands of the male and female parts of monoecious hop plants. From the results of resin analyses carried out in this investigation it would seem that the α-resin and β-resin are inherited independently and the total resin is merely the sum of the two quantities. J.R.L.

646. DARK, S. O. S., AND TATCHELL, A. R.
A note on the relationship between the density of resin glands on hop leaves and the resin content in the hop cones.
A.R. Wye Coll., Dep. Hop. Res., for 1955, 1956, pp. 60-7, bibl. 3.

From the comparisons described it is concluded that it is not possible to predict the resin content of the mature hop plant from a consideration of the density of the resin glands on the underside of the leaves. In general, the percentage of α-resin and of total soft resin was greater for cones growing at 4 ft. and 8 ft. from the ground than at 13 ft., but the number of resin glands was greatest on leaves picked at 13 ft. J.R.L.

647. FARRAR, R. F.
An investigation into the seed content of triploid hops.
A.R. Wye Coll., Dep. Hop. Res., for 1955, 1956, pp. 68-77, bibl. 5.

The seed content of dried cones from triploid seedlings of Bullion (Q43) was found to be less than half that from normal diploid Bullion plants. The average weight per seed, but not their average size, was also lower in the triploid plants. J.R.L.

648. BEARD, F. H., AND THOMPSON, F. C.
Height of wirework and spacing trial. Progress Report III.
A.R. Wye Coll., Dep. Hop Res., for 1955, 1956, pp. 78-83, bibl. 2.

Three years' results have shown that increasing the height of wirework produces the type of growth considered suitable for machine picking, without having the unfavourable effect on crop yield shown by increasing the width of spacing. In these years the highest yield, with Fuggle, has been consistently obtained with 15-ft. wirework; with 3 other varieties the highest yields have been obtained with 17¼-ft. wirework. [From authors' conclusions.]

649. THOMPSON, F. C., JARY, C. L., AND CHIPPINDALE, H. G.
The growth of hops in grass swards.
A.R. Wye Coll., Dep. Hop Res., for 1955, 1956, pp. 84-101, bibl. 1.

Three years' observations (1953–55) in several hop gardens have shown that hops can be grown satisfactorily in a grass sward, given a suitable seeds mixture (e.g. a timothy/clover mixture), close control the grass and correct nitrogenous manuring. How- r, seasonal conditions play a more important part n with clean-cultivated hops, and persistent cold ather in spring may check growth, thereby reducing crop to an uneconomic level. J.R.L.

0. D.S.I.R., New Zealand.
Hop research.
A.R. D.S.I.R., N.Z., 1955–56, 1956, p. 16.

cultural trials there have been strong indications that use of organic N (dried blood or blood and bone) fertilizer increases the number of hills lost by root in commercial gardens. Root rot was also in- ased by leaving the bines uncut and coiled round hills as compared with cutting and removal of the es.

1. Cripps, E. G., and Weston, E. W.
A note on the effect of boron on the resin and sugar contents of the hop cone.
A.R. Wye Coll., Dep. Hop Res., for 1955, 1956, pp. 102-3, bibl. 3.

eriments have shown that the general effect of ied B is to depress the content of both total soft ns and α-resin and to raise that of reducing sugars he cones. J.R.L.

2. Zattler, F.
Investigations on nutrient utilization by the hop plant.
Hopfen Rundschau, 1956, No. 5, pp. 53-6; No. 6, pp. 72-6; No. 7, pp. 85-8, from abstr. in *A.R. Wye Coll., Dep. Hop Res., for 1955*, 1956, pp. 129-31.

experiments were carried out over a 5-year period vestigate the effect of premature cutting of the hop , as is customary with machine picking. Leaves, , laterals and cones were analysed for N, P_2O_5, and CaO to determine the extent of transfer of ents to the rootstock in plants harvested at the of August compared with those left until mid- mber. Among the former further comparisons made between cutting at 1 m. and 3 m. and the val of shoots and leaves at the time of picking. utrient withdrawal during the period September– ember was most marked in the case of N and least Ca. Nutrient losses due to leaching were also mined and, if these are also taken into account, utrient withdrawal into the rootstock is consider- and explains the reduced yields from plants with aturely cut bines or those deprived of side shoots leaves at picking time. When the total amounts utrients used by the plant were compared with those lied by manuring it was found that the percentage utrient utilization to fertilizer supplied was highest hops were not cut when picked.—Bavarian Hop Stat., Hüll. J.R.L.

. Jary, C. L., and Chater, G. P.
Machine picking of hops.
Agriculture, Lond., 1956, **63**: 224-8, illus.

present position of mechanical hop-picking in nd is surveyed. In 1955 machines picked about of the crop. Both stationary and field machines vailable, but only the former are in large-scale t present, and their mode of operation is des- d. Damage to hops by mechanical picking has been much reduced, but the main English variety, Fuggle, is easily bruised.

654. Darling, H. S., and Thompson, F. C.
The effect of machine picking on the resin content of hops.
A.R. Wye Coll., Dep. Hop Res., for 1955, 1956, pp. 104-15, bibl. 4.

Surveys were carried out in 1954 and 1955 on a total of 64 pairs of pocket samples, each pair comprising one machine-picked and one comparable hand-picked sample. Part of each was analysed for total soft resins and the rest sorted into 4 fractions, whole hops, broken hops, petal plus seed and leaf plus stem. The machine-picked hops contained 0·78% less total soft resins in both years and significantly more leaf and stem. Whole hops from machine-picked samples contained significantly less resin than whole hops from hand-picked samples. No correlation was found between cone breakage and resin loss. J.R.L.

655. Carden, P. W.
Control of the hop-damson aphid with dimefox.
Plant Path., 1956, **5**: 110-11.

A method of applying small quantities of systemic insecticides to hop crowns by a ladle was tested in nursery plots. Rates of 0·62% and 1·24% dimefox were used, and at both rates the numbers of nymphs were reduced to very low levels within a week of treatment. In comparison with plots sprayed twice with schradan, dimefox gave better aphid control.—N.A.A.S., Cambridge.

656. Kačova, M.
Pojava crvenog pauka u hmeljanicima savinjske doline god. 1955. I borba protiv njega. **(Incidence of red spider mite in hop gardens of the Savinsk valley in 1955. Control measures.)** [German summary $1\frac{1}{4}$ p.]
Bilj. Proizv., 1956, **9**: 51-74, bibl. 6.

The effects of soil texture, water table, temperature and crop age on intensity of infestation by *Tetranychus altheae* are described. Attacks detected in the earliest stages were controlled by spraying with acaricides at 2,500–3,000 l. per ha. The advertised quantities were inadequate. For light attacks sulphur preparations were effective. These were used in combination with copper fungicides until cone formation, with beneficial effects on crop growth. Good control was achieved with a 0·08–0·1% spray of 20%-active parathion or 0·3% of 50%-active malathion. The former damaged the leaves when mixed with copper fungicides or when droplet size was too great. The best results were obtained with systox at 0·05% or metasystox at 0·1%. Pestox was effective for shorter periods. Terra sytam, the most persistent systemic, had a faster action in untilled than in tilled soil. All systemics stimulated crop growth. The best ovicide was 0·15% tedion applied twice with a 3-week interval.

Plant sources of antibiotics.

657. Ferenczy, L.
Antibacterial substances in seeds.
Nature, 1956, **178**: 639-40, bibl. 6.

Among the 400 species tested 36 yielded positive results, and in most cases the effect was selective.—Univ. Szeged, Hungary.

658. Masiluñgan, V. A., and others.
Screening of Philippine higher plants for antibacterial substances.
Philipp. J. Sci., 1955 (issued 1956), **84**: 275-99, bibl. 18.

Among 329 species, screened for substances inhibitory to *Micrococcus aureus* and *Escherichia coli*, marked antagonism to both organisms was shown by extracts of *Polanisia icosandra*, *Cydista aequinoctialis*, *Elephantopus mollis* and *Gnetum gnemon*.

659. Hovadík, A.
Antimikrobiální látky v zeleninách. (**Antibiotic substances in vegetables.**) [Russian, English and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1956, **29**: 589-606, bibl. 123.

The antibiotic properties of 68 types and varieties of vegetables were studied. Volatile fractions of onions, garlic and horseradish were found to be strongly antibiotic and in many cases possessed a slightly phytoncidal effect.

660. Boll, P. M., and others.
Antibacterial substances in seed plants active against tubercle bacilli. III. Solanocapsine, the antibacterial alkaloid of *Solanum pseudocapsicum*.
1956 Antibiotics Annual, 1956, pp. 255-59, from abstr. in *Quart. Bull. Mich. agric. Exp. Stat.*, 1956, **39**: 192-3.

Crude extracts of *Solanum pseudocapsicum* leaves, stems, and roots were found to be inhibitory in vitro to *Mycobacterium tuberculosis* H37. Isolation and characterization of the active principle showed it to be the alkaloid first isolated from leaves of this plant by Barger and Fraenkel-Conrat in 1936. There is some indication that yet another compound with antibacterial properties but a different antibacterial spectrum may be present.

Rubber plants.

(*See also* 669h, j, r-u.)

661. González Gómez, C., Gallego y Gómez F., and Swiatopolk-Mirski, A.
Contribucíon al estudio del contenido en gutapercha de las hojas de *Eucommia ulmoides* Oliv. (**A contribution to the study of the gutta-percha content of the leaves of *Eucommia ulmoides*.** [English and French summaries ½ p. each.]
Farmacognosia, 1955, **15**: 205-20.

Experiments showed that the yield of gutta-percha from the leaves of a 3-year-old tree of *E. ulmoides* was as great as that of an adult one. Size and colour of leaves bore no relation to gutta-percha content, but the content increased as the leaves matured. An increase in gutta-percha content was generally accompanied by a decrease in the content of resins.

Seed oils.

(*See also* 45, 376, 669v, w, 670g.)

662. Commonwealth Economic Committee.
Vegetable oils and oilseeds.
[*Publ.*] *Commonw. econ. Cttee*, 1956, pp. 182, H.M. Stationery Office, London, 5s.

The sub-title of this publication is "A review of production, trade, utilization and prices relating to groundnuts, cottonseed, linseed, soya beans, coconut anc oil palm products, olive oil and other oilseeds and oil [including tung]." This edition gives data for the mor recent post-war years up to 1954 and, where available provisional data for 1955.

663. Toyama, Y., and Takai, H.
Sechs bisher unbekannte pflanzliche Öle aus Japan. (**Six hitherto unknown vegetable oils from Japan.**)
J. Jap. Oil chem. Soc., 1955, **4**: 321, from abstr. in *Oléagineux*, 1956, **11**: 616.

A report on the characteristics and fatty acid com position of the oils of *Clerodendron tricotonum*, *Mallotu japonica*, *Hamamelis japonica*, *Pittosporum tobira* *Phytolacca americana* and *Euonymus japonica*.

664. Gil Quinza, S., and Ribosa Arno, P.
Contribution à l'étude de l'huile de chaulmoogra et de quelques-uns de ses dérivés. (**A contribution to the study of chaulmoogra oil and some of its derivatives.**)
Oléagineux, 1956, **11**: 619-25, bibl. 27, illus.

Chaulmoogra oil, used in treating leprosy, is obtaine from the seeds of *Hydnocarpus wightiana*, *H. anthe mintica*, *Taraktogenos kurzii*, *Carpotroche brasiliensi* *Calancoba echinata* and *C. welwitschii*. Its chemist and that of some of its derivatives are discussed. T main physical and chemical constants of the oi obtained from these 6 plants are compared, and studi on the chemistry and bactericidal properties of chau moogra oil derivatives are reported.

665. Bienaymé, A., Servant, M., and Desmarest, J.
La conservation des amandes de karité. (**Storage of shea-butter nuts.**)
Oléagineux, 1956, **11**: 635-44, bibl. 2, illus.

In tests on the preparation and storage of shea-butt nuts the best results were obtained when there w little delay between the operations. A furnace de loped at Niangoloko, which is based on the desi of a Philippine copra drier, has given excellent resu in drying the nuts.

Sundry plants.

(*See also* 669d, e, l, m, 670a, n.)

666. Chittenden, A. E., and Morton, D.
Six species of sedges and rushes from Northern Rhodesia.
Colon. Plant Anim. Prod., 1955 (issued 1956), **5**: 217-29.

In pulping trials, using the sulphate process, it was o possible to produce low yields of wet, rather we unbleached pulps from *Pycreus mundtii*, *Vossia cus data*, *Eleocharis plantaginea*, *Cyperus auricomus* a *Cyperus papyrus*. The sixth species *Phragmites co* *nis* gave a rather higher yield of freer pulp. The p of some of the species was readily bleached to duce a white paper, but their rather poor strength ld necessitate admixture with a stronger bleached p.

7. Viado, G. B.
Insecticidal treatment of bamboo against *Dinoderus minutus* Fabr.
Philipp. Agric., 1955, **39**: 133-46, bibl. 7, illus.

3 insecticides tested on freshly harvested culms of *busa vulgaris* DDT was the most effective in venting attacks of *Dinoderus minutus*. PCP was fective. DDT-PCP and BHC-PCP mixtures were effective than DDT or BHC used alone. The lower of the culm was more susceptible to the borer than upper half.

3. Eddy, B. P.
The suitability of some algae for mass cultivation for food, with special reference to *Dunaliella bioculata*.
J. exp. Bot., 1956, **7**: 372-80, bibl. 8.

nty-five strains of freshwater and saltwater algae been investigated for their suitability for mass vation for food. Under laboratory conditions a of *Dunaliella bioculata* has been found to give comparable with those obtained from *Chlorella*. suggested that only when the growing algal cells exposed in very thin layers will the yield not be ed by light penetration. The storage poly-haride of *D. bioculata* contains a 1 : 4-glucosan bling starch. All the essential amino-acids have shown to be present with the possible exception ethionine or valine and tryptophane. [Author's ary.]—Low Temp. Stat. Res. Biochem. Biophys., . Cambridge, and D.S.I.R.

Noted.

Abraham, P.
Spices as intercrops in coconut and arecanut gardens.
Bull. Indian centr. Coconut Cttee, 1956, **10**: 12-15, illus.
Peppers, cardamoms, ginger and turmeric.

Banerjee, A. K., and Ghosh, C.
Isolation of *d*-mannitol from *Pavetta indica* L.
Sci. and Cult., 1956, **22**: 114, bibl. 2.
The medicinal bitter principle of the root bark.

Cabo Torres, J.
Estudio farmacognóstico de la hoja de ruda (Ruta graveolens). Sus principales componentes: rutosido y esencia. **(A pharmacological study of the leaf of rue. Its principal components: rutoside and essential oil.)**
Farmacognosia, 1950, **10**: 275-361, bibl. 187, illus. [received 1956].

d Cabo Torres, J., and García Tapia, M. del P. P.
Nota acerca del contenido en piretrinas de dos pelitres cultivados. **(A note on the pyrethrins content of two samples of cultivated pyrethrums.)**
Farmacognosia, 1951, **11**: 309-13, bibl. 11 [received 1956].
Higher in plants grown without than with irrigation.

e Cabo Torres, J., García Tapia, M. del P. P., and Ností Nava, J.
Sobre el contenido en piretrinas de pelitres cultivados. Nota II. Ensayo previo acerca de la influencia del nitrosulfato amónico, como fertilizante. **(The pyrethrins content of cultivated pyrethrums. Note II. A preliminary trial on the effect of ammonium nitrosulphate as a fertilizer.)**
Farmacognosia, 1952, **12**: 275-83, bibl. 4 [received 1956].
No significant effect on flower yield or pyrethrins content.

f Carangal, A. R., Jr., and Manzanilla, E. B.
Biochemical studies of abacá mosaic virus and bunchy-top of abacá virus: I. Effect of virus infection on catalase activity of the host.
Philipp. Agric., 1954, **38**: 515-17, bibl. 3 [received 1956].
Mosaic reduced catalase activity; bunchy-top produced variable results.

g Cromwell, B. T.
The separation, micro-estimation and distribution of the alkaloids of hemlock (*Conium maculatum* L.).
Biochem. J., 1956, **164**: 259-66, bibl. 24.
Methods described and discussed.

h Dorado Bernal, E.
Estudio histoquímico del *Ilex aquifolium*. Contribución al estudio de la formación del caucho en los vegetales. **(A histochemical study of *Ilex aquifolium*. A contribution to the study of rubber formation in plants.)** [English summary ¾ p.]
Farmacognosia, 1952, **12**: 109-52, bibl. 29, illus. [received 1956].

i Dorado Bernal, E.
Determinación por partición cromatográfica de un glucósido cardiotónico en las hojas de "*Gomphocarpus fruticosus*". **(Determination by partition chromatography of a cardiac glycoside in the leaves of *Gomphocarpus fruticosus*.)** [English summary 8 lines.]
Farmacognosia, 1954, **14**: 241-9, bibl. 10, illus. [received 1956].

j Dorado Bernal, E.
Separación del caucho vegetal por partición cromatográfica en papel. **(The separation of plant rubber by partition paper chromatography.)**
Farmacognosia, 1955, **15**: 363-78, bibl. 20, illus.

k DORADO BERNAL, E., AND ALVAREZ MARTÍN, M. DE LOS D.
Estudio histoquímico de las fibras de *Asclepias*. **(A histochemical study of the fibres of *Asclepias*.)**
Farmacognosia, 1953, **13**: 17-32, bibl. 5, illus. [received 1956].

l FOGLINO, F.
La coltivazione del piretro in Kenya. **(Cultivation of pyrethrum in Kenya.)**
Riv. Agric. subtrop., 1956, **50**: 357-63, illus.

m FORSHAW, J. E.
Basket willows in Somerset.
Agriculture, Lond., 1956, **63**: 229-32, illus.
The cultivation of *Salix triandra* described.

n GALLEGO Y GÓMEZ, F., AND IBÁÑEZ MARTÍN, M. L.
Algunas consideraciones acerca de la valoración de la mentona en las esencias de menta. **(Some considerations on the determination of menthone in the essential oils of mint.)** [English and French summaries 8 lines each.]
Farmacognosia, 1955, **15**: 261-73, bibl. 9.

o GARCÍA MARQUINA, J. M., AND GALLARDO VILLÁ, M.
Saponinas del "*Thymus vulgaris*" L. **(Saponins from *Thymus vulgaris*.)**
Farmacognosia, 1949, **9**: 261-76, bibl. 12 [received 1956].

p GIRÁU BACH, L.
Farmacognosia de la "*Calluna vulgaris* (L.) Hull" (brezo común) de la región N.E. de España. **(Pharmacology of *Calluna vulgaris* in the N.E. region of Spain.)**
Farmacognosia, 1955, **15**: 49-144, bibl. 171, illus.
With particular reference to the drug arbutin and to tannins.

q GONZÁLEZ GÓMEZ, C., AND CARRERAS MATAS, L.
Contribución al estudio del estrofanto de nuestra Guinea. **(A contribution to the study of *Strophanthus* in Spanish Guinea.)** II. Alteraciones que experimenta la g-estrofantina baja la acción de los ultrasonidos. **II. Changes induced in the g-strophantin by the action of ultrasonics.)**
Farmacognosia, 1950, **10**: 63-70, bibl. 2; 1952, **12**: 153-67, bibl. 14 [received 1956].

r GONZÁLEZ GÓMEZ, C., GALLEGO Y GÓMEZ, F., AND SWIATOPOLK-MIRSKI, A.
Acerca de una especie vegetal interesante, como fuente productora ce caucho: la *Asclepias syriaca* L. **(A plant species interesting as a source of rubber: *Asclepias syriaca*.)**
Farmacognosia, 1949, **9**: 7-12 [received 1956].

s GONZÁLEZ GÓMEZ, C., GALLEGO Y GÓMEZ, F., AND SWIATOPOLK-MIRSKI, A.
Algunas consideraciones acerca de la *Asclepias sullivantii* Engelm., como especie cauchífera de interés. **(Some considerations on *Asclepias sullivantii* as a rubber-producing plant of interest.)**
Farmacognosia, 1952, **12**: 99-107 [received 1956].

t GONZÁLEZ GÓMEZ, C., GALLEGO Y GÓMEZ, F., AND SWIATOPOLK-MIRSKI, A.
Algunas consideraciones acerca del *Evonymus japonica*, arbusto gutaperchífero español. **(Some considerations on *Euonymus japonica*, a Spanish source of gutta-percha.)**
Farmacognosia, 1953, **13**: 11-16, illus. [received 1956].

u GONZÁLEZ GÓMEZ, C., GALLEGO Y GÓMEZ, F., AND SWIATOPOLK-MIRSKI, A.
Acerca de la posibilidad de obtención subsidiaria de caucho de los pericarpios de diferentes especies del género *Asclepias*. **(The possibility of obtaining rubber from the hulls of various species of *Asclepias*.)** [English summary 1½ pp.]
Farmacognosia, 1954, **14**: 3-13 [received 1956].
In addition to rubber from the leaves.

v JOSHI, G. K., REBELLO, D., AND SHAH, S. M.
Solvent segregation of vegetable oils. II. Safflower oil.
J. appl. Chem., 1956, **6**: 281-3, bibl. 4.

w KRISHNAMURTHI, M. N.
Literature review on oils and fats, 1954.
[*Publ.*] *Coun. Sci. industr. Res. New Delhi*, 1956, pp. 55, bibls.
Including 55 references on cultivation and storage of oil seeds.

x LEE, L. A., AND OGG, C. L.
Improved apparatus and method for the determination of the volatile oil content of spices.
J. Ass. off. agric. Chem. Wash., 1956, **39**: 806-16, bibl. 15, illus.
A quicker, more accurate method described with examples.

y LEWIS, J. J.
The *Rauwolfia* alkaloids.
J. Pharm. Pharmacol., 1956, **8**: 465-94, bibl. 281, from abstr. in *Trop. Abstr.*, 1956, **11**, No. d1944.
A review, including botany and alkaloid chemistry and determination.

z LUNA MORENO, C.
El cultivo de raíces aisladas de *Atropa belladonna* L. como método en la investigacion de la génesis de sus alcaloides. **(The culture of isolated roots of *Atropa belladonna* as a method of investigating alkaloid formation.)** [English summary p.] ¾
Farmacognosia, 1951, **11**: 1-126, bibl. 168, illus. [received 1956].

McClure, F. A.
New species in the bamboo genus *Phyllostachys* and some nomenclatural notes.
J. Arnold Arbor., 1956, **37**: 180-96, bibl. numerous in text, illus.
Descriptions of new species and cultivars of other species.

Madueño Box, M.
Influencia de los abonos nitrogenados sobre las diversas variedades de estramonio y evolución de su riqueza alcaloídica a lo largo del año. **(The effect of nitrogen fertilizers on different varieties of *Datura,* and seasonal changes in their alkaloid content.)**
Farmacognosia, 1948, **7**: 46-82 [received 1956].

Mei, A.
Raccolta, tecnologia e cause nemiche del pepe nell'Asia orientale. **(Harvesting, processing and sources of injury to pepper in East Asia.)**
Riv. Agric. subtrop., 1956, **50**: 396-420, illus.
Sources of injury include diseases, insects and nematodes.

Menon, A. K.
Cananga (ylang-ylang).
Bull. Indian centr. Coconut Cttee, 1956, **10**: 23-4, bibl. 2, illus.
Notes on the tree, *Cananga odorata*, flower harvesting and oil distillation.

Narasimhachar, S. G.
Latin and Kannada names of indigenous and medicinal plants of Mysore.
Bot. Ser. Bull. Mysore St. Dep. Agric. **1**, 1952, pp. 120, bibl. 20 [received 1956].
Records 1,636 species.

Ností Nava, J., Cabo Torres, J., and Panadero Vidal, M.
Sobre el cultivo del cilantro.—Influencia de los abonados amónico y fosfopotásico. **(The culture of coriander. The effect of ammonium and phosphopotassic fertilizers.)**
Farmacognosia, 1953, **13**: 71-80, bibl. 9 [received 1956].
Nitrogen increased essential oil content.

Poliakoff, J.
Les oléagineux du Brésil. **(The oil plants of Brazil.)**
Oléagineux, 1956, **11**: 653-9, bibl. 26.
Including castor, olive and tung.

h del Río Ibáñez, J., and Ruiz Gijón, J.
Estudios sobre la *Rauwolfia serpentina* Benth. y algunos de sus alcaloides puros. **(Studies on *Rauwolfia serpentina* and some of its pure alkaloids.)**
Farmacognosia, 1955, **15**: 145-201, bibl. 66 +109, illus.

i Ruiz Gijón, J., and del Río Ibáñez, J.
Estudios sobre la *Rauwolfia serpentina* Benth. y algunos de sus alcaloides puros. (Segunda parte.) **(Studies on *Rauwolfia serpentina* and some of its pure alkaloids. Part II.)**
Farmacognosia, 1955, **15**: 221-59, bibl. 77 +27, illus.

j San Martín Casamada, R.
Nuevas investigaciones farmacologicas en el género *Atropa.* **(New pharmacological investigations on the genus *Atropa.*)** +
Farmacognosia, 1953, **13**: 357-65, bibl. 10 [received 1956].
Six *Atropa* species, varieties and hybrids.

k Serranillos, M. G.
El cultivo de la belladona en Galicia. **(The culture of belladonna in Galicia.)**
Farmacognosia, 1950, **10**: 59-62, bibl. 5 [received 1956].

l Spetsig, L. O., and Steninger, M.
Resolution of mixtures of cohumulone, humulone and adhumulone by reversed phase partition chromatography.
J. Inst. Brew., 1956, **62**: 33-6, bibl. 10.
Of quantitative as well as qualitative value.

m Stoll, A.
Acerca de las substancias cardiotónicas de la escila marítima *Scilla maritima* L. **(The cardiotonic substances of *Scilla [Urginea] maritima.*)**
Farmacognosia, 1954, **14**: 169-203, bibl. 30, illus. [received 1956].

n Stott, K. G.
Cultivation and uses of basket willows.
Reprinted from *Quart. J. For.*, April, 1956, pp. 14, illus.

o Tolibas, P. C.
Methods of processing vanilla pods.
Philipp. Agric., 1954, **38**: 508-14, bibl. 5, illus. [received 1956].
Three methods of curing compared.

p Watson, G. A., and Darling, H. S.
A note on a thermometric instrument for determining the end point of drying hops in commercial practice.
A.R. Wye Coll., Dep. Hop Res., for 1955, 1956, pp. 116-22, bibl. 2.
Electrically operated instrument originally developed in the U.S.A.

FLORICULTURE.

General.

(*See also* 4, 24, 25, 31, 406, 742c, f, j, k, r, s, v, x, 743a, d, g, j, l, m, r, s, 797, 955, 974, 994, 997, 1003b.)

671. Nakasone, H. Y., and Bowers, F. A.
Mist box propagation of cuttings.
Hawaii Fm Sci., 1956, **5**(1): 1, 7, 8, illus.

A description is given of an efficient intermittent mist box used at the Hawaii Agricultural Experiment Station. Vermiculite is the most suitable rooting medium, and cuttings with leaves root better than defoliated ones. Experiments have shown that the following plants root quicker and better than usual under these conditions—carnations, hibiscus var. Peachblow, *Jasmine officinale*, passion fruit (*P. edulis* var. *flavicarpa*), *Murraya exotica* and guava. J.R.L.

672. Stangler, B. B.
Origin and development of adventitious roots in stem cuttings of chrysanthemum, carnation, and rose.
Mem. Cornell agric. Exp. Stat. **342**, 1956, pp. 24, bibl. 26, illus.

The initials giving rise to an adventitious root primordium in stem cuttings of chrysanthemum, carnation, and rose arise within a single cell layer as a small group of cells which become meristematic. Other adjacent cells later contribute to the primordium. In chrysanthemum, a few pericyclic cells immediately inside the endodermoid layer in the interfascicular region become root initials. In carnation, initials develop in a layer of parenchymatous pericyclic cells inside the sheath of mature and immature pericyclic fibres. In stem cuttings of rose, immature multiseriate ray tissue of secondary phloem close to the cambium gives rise to the initials of an adventitious root. Roots were not found to arise from cambium or from fascicular tissues. Although callus was present at the base of rose cuttings, root primordia were not found in this tissue. [From author's summary.]

673. Steavenson, H.
Soil mixtures for container stock.
Amer. Nurserym., 1956, **104**(8): 14-15, illus.

Tests were carried out with 4 types of potting soil for 22 varieties of ornamental plants grown in metal containers at a nursery in Missouri. A mixture of clay subsoil and Krilium generally resulted in better growth than a mixture of top soil and Krilium, with or without peat and sand, or than John Innes potting compost. It also showed less shrinkage and compaction and was cheaper. On the basis of these results it has been decided to obtain potting soil direct from a plot of soil with high clay content, field-mixed with Krilium, J.I. base fertilizer and manure to a depth of 12 inches, and sterilized with allyl alcohol drench to destroy weed seeds.

674. Klešnin, A. F.
Growing ornamental plants in artificial light.
[Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, **10**: 122-8, illus.

Types of lamp and the uses of artificial illumination in ornamental horticulture are discussed. The response to supplementary and uninterrupted illumination is recorded for many summer flowers, bulbs, greenhous plants and foliage plants grown in dwelling houses underground stations, etc.

675. Mayer, L.
Wachstum und Organbildung an in vitro kultivierten Segmenten von *Pelargonium zonale* und *Cyclamen persicum*. **(Growth and organ formation of *Pelargonium zonale* and *Cyclamen persicum* segments cultured in vitro.)**
Planta, 1956, **47**: 401-46, bibl. 16, illus.

Callus formation from the cambium and medulla o *Pelargonium* segments was increasingly stimulated by NAA at concentrations up to 0·1 mg./l., at which leve root development was optimal. At concentration between 0·1 and 0·8 mg./l. callus formation from cambial tissue was depressed and that from subepidermal marginal cells was stimulated; roots from this callus were thin and did not develop normally. NAA at rates up to 0·2 mg./l. stimulated shoot formatio from *Cyclamen* segments. At concentrations increasing from 0·4 to 3 mg./l. root formation was increased NAA at 2 to 10 mg./l. induced marked callus formatio on the segment surfaces. Adenine encouraged th segments to form shoots, the optimum rate bein 120 mg./l. Guanin increased the number of roots pe segment from 1 to 9. Phosphate application favoure shoot, root and callus formation. Most cyclame plants transferred to soil after 100 days in cultur developed normally.—Bot. Inst., Univ. Erlangen.

676. McFaul, J. A.
Stem rot in carnations and poinsettias.
Flor. Exch., 1956, **127**(9): 43.

In tests at Cornell and in Nassau County, N.Y. Terraclor applied at 1 lb. 75% W.P./100 gal. or 3 lb 20% dust per 400 sq. ft. of bench or bed controlle the spread of wet stem rot (*Rhizoctonia* sp.) in carna tions and poinsettias, but did not control *Pythiu* rots. Semesan applied as a soil drench at 1½ lb 100 gal. per 400 sq. ft. is also recommended for us against *Rhizoctonia* rots.

677. Jefferson, R. N., and Morishita, F. S.
Rohm and Haas FW-293 for mite control on ornamentals.
J. econ. Ent., 1956, **49**: 392-3, bibl. 3.
Morishita, F. S., and Jefferson, R. N.
New spray controls rose spider mites.
Flor. Exch., 1956, **127**(5): 15, 41.

Cyclamen mite (*Steneotarsonemus pallidus*), privet mi (*Brevipalpus inornatus*) and the 2-spotted mite (*Tetr nychus telarius*) were successfully controlled by FW-29 (Kelthane) on various ornamental plants includi roses. Plant tolerance to the spray appeared to b excellent.—Univ. Calif., Los Angeles.

Annual and herbaceous plants.

(*See also* 294, 742b.)

678. Clauss, B.
Klasseneinteilung unserer Sommerastern nach Blumenformen. **(Classification of summer asters according to flower shape.)**
Gartenwelt, 1956, **56**: 344-6, bibl. 4, illus.

hirty-five aster (*Calistephus*) varieties are listed according to type of flower: I single, II semi-double, I fully-double (several subdivisions) with notes on ne of flowering, wilt resistance, height, growth and es.

79. Kamemoto, H., and Nakasone, H. Y.
Carnation variety trial.
Circ. Hawaii agric. Exp. Stat., **51**, 1956, pp. 18, bibl. 1, illus.

e variety trial described was carried out at the niversity Farm, Manoa Valley, where night temperares are generally above those considered optimal for t-flower production. The carnations compared were Mainland varieties and the local "Pink", a shortmmed carnation commonly grown from seed for the trade. The varieties were compared for productivity, wer size and stem length, calyx splitting, and grance. For cut flowers the outstanding variety s Apollo, other varieties of promise being Cassandra, pid and three Littlefield varieties, Light-Pink, ney and White. For leis Apollo, Aurora, Cupid, ink" and Titan can be recommended.

80. Puccini, G.
Ricerche sulla nutrizione del garofano rifiorente della Riviera. Secondo contributo. **(Studies on the nutrition of perpetual-flowering carnations on the Riviera. Part 2.)** [English summary ¾ p.]
Ann. Sper. agrar., 1956, **10**: 1495-1509, bibl. 1.

the variety Flora N, P and K were accumulated ing the vegetative phase, the ratio of N : P_2O_5 : O being 1 : 0·4 : 1·5 throughout the vegetative e. The plants contained traces of Fe, Mn, Li, , B and Al, but no Cu, Co, Zn or Ba. The soil tained neither Li nor Mo in demonstrable quantity. ults are briefly compared with those from previous k on the variety Anita [see *H.A.*, 24: 2936].

1. (Johnson, B. L.)
Grassy mutants can choke out carnations.
Flor. Exch., 1956, **127**: 17, 48.

gorous, grassy plants producing few or no flowers e been found in plantings of Red Sim, White Sim Peterson Pink. Grassiness was not transmitted grafting and is considered to be due to mutation. e number of cuttings collected from a 9-month-old mal plant was 9 and from a grassy plant 45. In ther blocks grassy cuttings produced 12% more tings than did normal plants.—Calif. agric. Ext. v.

2. Moreau, M.
Déséquilibre de la microflore fongique du sol dans les cultures d'oeillets Méditerranéennes. **(Unbalanced soil fungus microflora in Mediterranean carnation growing.)**
C.R. Acad. Agric. Fr., 1956, **42**: 557-9, bibl. 1.

sults are tabulated from a survey of parasitic and rophytic fungi found in 4 carnation soils and, for nparison, in a soil planted to olives. The growing carnations completely alters the fungal population, ich is less able to resist invasion by fungi pathogenic carnations. The equilibrium may be restored by mus applications and by practising strict hygiene.

683. (Skiver, R.)
Chemical misting reduces disease.
Flor. Exch., 1956, **127**(9): 42.

Five chemicals were applied to carnation cuttings under mist propagation for disease control. The incidence of *Alternaria dianthi* was significantly reduced by each of the chemicals, namely captan, tomatine, Omadine 1456, Omadine 1564 and Omadine 1483. *Fusarium roseum* f. *cerealis* was significantly reduced only by Omadine 1564. Rooting of cuttings was reduced by all the chemicals except when tomatine was applied to Miller's Yellow.

684. Schindler, A. F., and Stewart, R. N.
***Fusarium* wilt of carnations retarded by fungus-eating nematodes, *Ditylenchus* spp.**
From abstr. in *Phytopathology*, 1956, **46**: 469.

The percentage of wilt developing in carnations inoculated with both *Fusarium oxysporum* f. *dianthi* and *Ditylenchus* spp. was significantly lower than that developing in plants inoculated with the fungus alone.

685. Bois, E., and others.
Chrysanthèmes. **(Chrysanthemums.)**
Rev. hort. suisse, 1956, **29**: 293-363, illus.

The whole of this number of the *Revue* is devoted to chrysanthemums, and includes articles on breeding and cultivation, Japanese varieties, and growing methods in the United States, Germany, Switzerland and France.

686. Dovaston, H. F.
Report of the 1955 trials of early flowering chrysanthemum varieties in Scotland.
Res. Bull. W. Scot. agric. Coll., **14**, 1955, pp. 10.

The results are summarized of a trial of 96 chrysanthemum varieties grown out of doors and 24 grown under Dutch lights at Auchincruive. The information given consists of short notes on each variety, notes on the weather (especially in Aug., Sept., Oct.), variations in the flowering time of certain varieties in 1955 compared with 1954, and a table showing for each variety the colour class, flower type, plant height, numbers of saleable and unsaleable flowers per plant in 1955 and in 1952–53–54, and duration of cropping season.

687. Kirk, L. K., and Mahlstede, J. P.
Packaging and shipment of chrysanthemums for retail sale.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 549-58, bibl. 6, illus.

Various forms of package were compared for 3 batches of hardy chrysanthemum plants mailed from Iowa State College to East Lansing and back, a distance of about 1,200 miles. On their return the plants were planted under near-optimal conditions and their survival recorded. Packaging materials used included waxed paper, Kraft paper, polyethylene and cellophane. In some cases whole plants were enclosed, in others the root balls and tops were wrapped separately in different materials or the tops were left unwrapped. Corrugated cardboard boxes as outer covers afforded satisfactory protection during shipment. The results stress the important part played by shipping conditions and indicate that the requirements of the roots, as regards temperature and moisture, are quite different from those of the tops. In general, the use of polyethylene root bags with the tops of the plants left uncovered would appear to provide much better conditions for survival than current packaging methods.—Ia St. Coll., Ames.

688. INCZE, F.
Szaporítás—visszacsípés—virágzás közötti összefüggés a *Chrysanthemum indicum* L. két fajtájánál. (**The relationship between propagation, pinching and flowering in two varieties of *Chrysanthemum indicum*.**) [Russian and German summaries ¼ p. each.]
Agrártud Egy., 1954 (issued 1956), **18**(2, parts 3): 55-61, bibl. 2, illus.

Cuttings of the chrysanthemum varieties Blanche Poitevine and Blauball were taken on April 30, May 10 and May 30, 1954. The most suitable flowers for November 1 were produced by the plants propagated on May 10. The latest satisfactory date for pinching was July 10.

689. BIOLOGICAL BRANCH, N.S.W. DEPARTMENT OF AGRICULTURE.
Ray blight of chrysanthemums.
Agric. Gaz. N.S.W., 1956, **67**: 308-9, illus.

This disease, caused by *Mycosphaerella ligulicola*, attacks the flowers and to a lesser extent the leaves. The earlier chrysanthemum varieties appear to be the most severely attacked. The disease can be controlled by zineb at 6 oz./20 gal., applied once a week, beginning a few weeks before the first flowers open.

J.R.L.

690. COOPER, A. J.
The influence of cultural conditions on the development of *Alternaria* leaf spot of cinerarias.
J. hort. Sci., 1956, **31**: 229-33, bibl. 5.

None of the cultural conditions studied affected the resistance of cineraria plants to infection by *Alternaria senecionis*. Once infection had occurred the rate of spread of the pathogen, which was much more rapid in old than in young leaves, was increased by a high soil moisture content and reduced by N manuring under conditions of heavy shade and by P manuring under conditions of light shade. The lime content of the potting compost had no effect on the rate of spread. —Univ. Reading.

691. ROBINSON, J. A.
The modern gerbera.
N.Z. Gdnr, 1956, **12**: 591-3, 625-8, 632, 695-8, 786-91, illus.

This series of articles covers the history, introduction and development of gerberas in New Zealand, and their cultivation, propagation, breeding and exhibiting. New double varieties in a wide range of colours have been developed in New Zealand, and some of these are briefly described.

692. FRANKEL, R.
Graft-induced transmission to progeny of cytoplasmic male sterility in petunia.
Science, 1956, **124**: 684-5, bibl. 5.

In two series of experiments in 1954 and 1955 reciprocal grafts were made between fertile and male-sterile petunias. For reasons that remain unexplained plants of the fertile scion on male-sterile stock combinatio survived for rather longer than plants of the reciproca combination. In both experiments some of th progeny of the fertile scions were male-sterile. I seems most probable that this change was induced b the movement of cytoplasmic sterility determinant from stock to scion, but other possible explanations including nutritional disturbance, cannot be entirel excluded.—Univ. Calif., Davis.

693. KOVÁTS, Z.
Virágzásfenológiai megfigyelések a kerti oroszlánszáj (*Antirrhinum majus* L.) változatain, különös tekintettel a rozsdakártétel hátásának vizsgálatára. (**Phenological observations on the flowering of garden snapdragons.** [English and Russian summaries 2 pp. each.]
Agrártud. Egy., 1954 (issued 1956), **18**(2, part 3): 41-53, illus.

Trials were conducted in 1953 on 128 and in 1954 o 172 varieties of snapdragon. Tabulated results includ data on earliness, intensity of flowering over 10-da periods and degree of rust resistance. The mai flowering period for the great majority of varietie started in the last 10 days of June and lasted abou a month. A month of light flowering then intervene before a second major flowering period occurre Satisfactory second flowering was produced only b healthy plants, and rust infection reduced or prevente it. Rust damage was most evident under droug conditions. A correlation was found between intensi of flowering and rust susceptibility amounting t $r=0{\cdot}72$ in 1953 and $r=0{\cdot}51$ in 1954. While none the varieties tested was immune to rust, the best foreig varieties and selected indigenous varieties include 85 to 95% resistant individuals. Nevertheless, n more than 3% of all the plants in all the varieti resisted rust infection in both 1953 and 1954.

694. LEHOCZKY, J.
Az oroszlánszáj rozsdabetegségéről. (**Snapdragon rust.**) [Russian and German summaries 1 p. each.]
Agrártud. Egy., 1954 (issued 1956), **18**(2, part 3): 3-39, bibl. 64, illus.

Antirrhinum majus is very susceptible to snapdrag rust, *Puccinia antirrhini*, first found in Hungary in 193 while other species show total or partial resistan The fungus and its seasonal development are describe In control experiments Cu-containing materials did n give satisfactory results but S-containing materials su as zineb and ferbam applied at 1% were effecti Breeding for resistance is considered.

695. ARTJUŠENKO, Z. T.
On the origin of doubleness in stocks *(Matthiola incana)*. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1956, **108**: 1187-9, bibl. 7, illus.

Doubleness in stocks appears to be due to fasciati As a result of stem fasciation the phyllotaxy is d turbed, rudimentary flower buds appear at irregul distances and intergrow. As these buds are at differe stages of development the growing period of the flow is prolonged and organs capable of fertilization do n arise. The frequent occurrence of prolification ouble flowers is considered to support this explana- on. The causes of the disturbance in morphogenesis, hich result in fasciation of double flowered stocks e as yet unknown.

96. Kováts, Z.
A *Verbena venosa* ivartalan szaporítása. **(The vegetative propagation of *Verbena venosa*.)** [English and Russian summaries 4 lines each.]
Agrártud. Egy., 1954 (issued 1956), **18**(2, part 1): 91-9, illus.

olons of *Verbena venosa* overwintering in a frost-free ace were cut into single-node cuttings. Cuttings anted in boxes in the greenhouse in January, February d March and in cold frames and in the open in April ve similar results. Raising plants in the open was cheapest method, but using cold frames was safer.

Bulbs, tubers, etc.

(*See also* 388, 675, 742q, 743b, q, 986.)

97. Maatsch, R.
Einfluss der Knollengrösse bei Knollenbegonien. **(The effect of tuber size on the development of tuberous begonias.)**
Gartenwelt, 1956, **56**: 343-4, illus.

gonia tubers were grouped in four sizes, with meters ranging from 1·9–2·5 cm. to 4·1–5·0 cm., corresponding weights ranging from 2·3–5·9 g. 19·35–41·35 g. Plants raised from the largest ers gave the best results, in that they sprouted 9½ s sooner than the smallest-tuber group, flowered ays earlier, were bigger and suffered no losses.— Zierpfl. tech. Hochsch., Hannover.

98. Maatsch, R., and Rünger, W.
Über den Einfluss der Temperatur auf die photoperiodische Reaktion von Knollenbegonien. **(The effect of temperature on the photoperiodic response of tuberous begonias.)**
Gartenbauwiss., 1955, **2**: 478-84, bibl. 5.

nts of *Begonia tuberhybrida* var. *gigantea* were wn at temperatures of 10°, 15°, 20°, and 25° C. ng and after short photoperiods. The inhibiting ct of short days on growth was increased by low peratures. After 20 days at 20–25° C. combined short photoperiods, a change to low temperatures and 15° C.) caused death of the apical buds. High peratures (20° and 25° C.) following short-day tment reversed the growth inhibiting effect.— Zierpfl., tech. Hochsch., Hannover.

9. Biological Branch, N.S.W. Department of Agriculture.
Foliar nematode disease of ferns and begonias.
Agric. Gaz. N.S.W., 1956, **67**: 258-9, illus.

elenchoides olesistus causes patchy brown dis- oration of fern fronds and can be controlled by oving affected leaves and by spraying several times -week intervals with E605 or parathion at 1 oz. emulsion/5 gal. water or by applying a soil drench ystox at 1 fl. oz. 50% emulsion/4 gal. water. In nias the nematodes may spread rapidly killing ted leaves and sometimes whole plants. E605 is not effective in this case, but the Systox soil drench applied twice, 2–3 weeks apart, should give control.

J.R.L.

700. de Mol van Oud Loosdrecht, W. E.
Colchicin-Versuche mit grossblumigen Gladiolen. **(Colchicine studies with large-flowered gladioli.)**
Gartenbauwiss., 1955, **2**: 448-77, bibl. 11, illus.

Colchicine was applied to corms of 5 gladiolus varieties a few days before planting. With Blue Herald a 0·2% colchicine solution applied by the drop method for 3½ hours was the only treatment to give a positive result. A 2% lanolin mixture applied to Louis d'Or had no effect, and results with J. S. Bach and Snow Princess were variable. In tests with Silentium corms a 0·2% solution applied by the drop method gave better results than a 2% lanolin mixture. Removal of scale leaves or wounding the growing point before colchicine application proved unnecessary.—Lab. Strahlengenetik Zierpflanzenprüfung, Nieuwe Herengracht, Amsterdam.

701. Tsukamoto, Y., and Asahira, T.
Dormancy of gladiolus corms. II. On temperature treatment and the inhibiting substance. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1956, **25**: 133-40, bibl. 13.

Varietal differences in response to dormancy breaking by temperature treatment were studied. The percentage of corms sprouting was generally lower in early-dug corms than in late-dug corms, the exceptions being General Pincot and June Day. With all varieties treatment at 35° C. for 10 days followed by cold storage (0° C.) for 10 to 15 days was the most effective way of breaking dormancy. Chromatographic studies on corm extracts revealed the presence of an inhibiting substance at the time of sprouting (Oct. 25th) and of a growth substance in treated corms on Nov. 29th.

702. Bald, J. G., and Jefferson, R. N.
Interpretation of results from a soil fumigation trial.
Plant Dis. Reptr, 1956, **40**: 840-6, bibl. 7.

(1) A test of soil fumigation with Vapam [sodium N-methyl dithiocarbamate dihydrate] against gladiolus diseases and pests was used as an example in discussing soil fumigation trials. (2) A pilot planting made before the main trial on the same site extended the range of information obtained. (3) The best estimate of mite [*Rhizoglyphus rhizophagus*] populations was obtained from apparently normal corms in all treatments. Numbers were not necessarily a measure of the direct action of fumigant on the mites in the soil, because of the frequent association of mites with diseases. (4) A simple rating method for estimating the severity of bacterial scab [*Pseudomonas marginata*] on corms provided an estimate of infection roughly equivalent to a square root transformation of the percentage of corms obviously infected. (5) Cormels dipped in New Improved Ceresan and planted in soil given an intermediate dosage of Vapam were severely infected by scab; those in soil with a lower dosage were less severely infected. This was interpreted as due to the relative effect of treatments on the scab organism and its antagonists. (6) Fusarium (*F. oxysporum f. gladioli*]

infection decreased evenly with increasing Vapam dosage. (7) A crude mathematical model was formulated for the relation between fumigant dosage and infection of test plants grown in treated soil. The cumulative action of fumigant on the soil-borne pathogen population, and of the residual pathogens on the test plants were calculated to give an asymmetrical sigmoid relation between dosage (log dose) and percentage infection. (8) Some consequences of this type of relationship were found to explain what are often accepted as anomalous results of fumigation. [Authors' summary.]—Univ. Calif., Los Angeles.

703. (SEELEY, J. G.)
Precaution prevents hyacinth loosebud.
Flor. Exch., 1956, **127**(6): 16, 40.

Measures which will avoid loosebud (the shedding of the inflorescence shortly before flowering) are: storage of bulbs at 78° F. until planting to prevent too early development of the roots; late and fairly shallow planting; avoiding the use of ammonium sulphate in the autumn; and good drainage.

704. ROYAL HORTICULTURAL SOCIETY.
The lily year book, 1957, No. 20.
R.H.S., London, 1956, 9×5½ in., pp. 149, illus., 10s.+1s. postage or U.S.A. $1.65 post free.

Various aspects of lily growing in the southern hemisphere are described in a total of six articles from New Zealand, Australia and Northern Transvaal. Several newly-discovered lilies from the West Coast of North America are described by L. Beane, and A. M. Vollmer gives an account of finding some of them. W. Ingwersen writes on lilies in the rock-garden, and a symposium on "My five favourite lilies" contains articles by 3 contributors. The subject of a Lily Group discussion led by J. Newell is the raising of lilies from seed [see also *J. roy. hort. Soc.*, 1956, **81**: 488-92, and next abstract].

705. ALVEY, N. G.
Experiments with *Lilium auratum*.
R.H.S. Lily Yearb. 1957, No. 20, pp. 63-6, illus.

Germination of *Lilium auratum* seeds was similar in JIS, Bedford sand and vermiculite. Germination after return to a warm temperature was quicker when seeds were put in a cold frame 4 months after sowing than 6 months after sowing. There was an indication that better growth and more flowers resulted from the use of JIS for pricking out than of JIP 1. The best potting sequence appeared to be JIS for pricking out, JIP 1 for potting-on into 3½-in. pots and JIP 2 or JIP 3 for potting-on into 5-in. pots.—John Innes hort. Instn.

706. LAHTZ, K.
Unkrautbekämpfung und Gründüngung in Maiblumenkulturen. (**Weed control and green manuring for lilies-of-the-valley.**)
Gartenwelt, 1956, **56**: 290-1.

Calcium cyanamide was broadcast and raked into lily-of-the-valley plots shortly before sprouting. In the second half of April the plots were cleaned and mustard was sown. This crop was left as a ground cover and green manure during the winter. Weeds were successfully controlled, and costs of hoeing reduced.

707. ROYAL HORTICULTURAL SOCIETY.
The daffodil and tulip year book, 1957, No. 22.
R.H.S., London, 1956, 9×5½ in., pp. 150, illus., 10s.+1s. postage or U.S. $1.65 post free.

Among the many interesting articles in this editic dedicated to Guy L, Wilson, are those on the 19 daffodil season, results of and reminiscences on daffo breeding, an account of the development of bu cultivation in Lincolnshire, reports of the Americ Daffodil Convention and daffodils in America, Au tralia and New Zealand. There is also an article tulips for home decoration. J.R.L.

708. WOODVILLE, H. C.
Further experiments on the control of bulb fly in narcissus.
Plant Path., 1956, **5**: 73-4.

Observations have confirmed that *Merodon equest* can be satisfactorily controlled by dipping bulbs f 15 mins. in cold 0·2% solution of aldrin or dieldr The addition of aldrin, dieldrin or chlordane to a h water bath gave protection against bulb fly, but su sequent bulb growth was poor. Hot water treatme for 2¾ hours followed by dipping in an aldrin soluti also resulted in poor growth.—N.A.A.S., Starcro Exeter.

Lawns.

(*See also* 360-363, 742t, y, z, 743i.)

709. DAVIS, R. R.
Questions and answers on features of Meyer Zoysia grass.
Ohio Fm Home Res., 1956, **41**: 44-5, 47, illus.

Meyer Zoysia, an improved strain of *Zoysia japoni* is not considered suitable for most of Ohio, beca the leaves are killed by autumn frosts and the la remains brown until the spring. It is planted as plugs or sprigs and once established will keep out m weeds and is tolerant of drought. It will grow on p soils if fertilized. J.R.L

710. DANIEL, W. H.
Dowfume MC-2 for new lawns.
Down to Earth, 1956, **12**(2): 8-10, illus.

Details are given of a method of fumigating new la areas or old lawns prior to reseeding, using M [methyl bromide] at the rate of 1 lb. per 100 sq. This treatment in combination with aeration spiking gave a very good weed free coverage on ne sown areas.

711. FERTIG, S. N., AND VEGA, M. R.
The inhibiting effect of maleic hydrazide (MH-40) on lawn grasses.
Philipp. Agric., 1956, **39**: 473-82, bibl. 11, illus.

A 2% solution of MH sprayed at a rate of 1,000 l./ turned the leaves of lawn grasses brown. The ef became apparent 4 days after spraying and persis up to the end of the experimental period (48 da A spray of 0·5% MH at 500 l./ha. gave the m promising results; after a November application grass did not need cutting for 100 days.

Orchids.

(*See also* 743n.)

12. DAVIDSON, O. W.
New orchid potting medium lowers cost of production.
N.J. Agric., 1956, **38**(2): 3-6, illus.

dies to find suitable, inexpensive media for orchids ainly *Cattleya* and its hybrids) were started at tgers University in 1952. Two mixtures were nd to give satisfactory results. One contained al parts of coarse peat moss, dried, undecomposed leaves and redwood bark fibre, and the other the ne materials plus coarse sand. Shredded white fir k (*Abies concolor*) was also a satisfactory potting dium. Cultural recommendations for use with se media are given.

3. GRIFFIN, D. E., LUBATTI, O. F., AND HARRISON, I. R.
Effect of methyl bromide fumigation on orchids.
Plant Path., 1956, **5**: 53-6, bibl. 2, illus.

mage after methyl bromide fumigation of orchid nts was of two types. *Cymbidium* plants showed wn spotting of the leaves, but in other genera dual browning of the leaves was followed by leaf . Damage to *Cymbidium* after fumigation at F. was severe but was only slight at 60° F. Young wth was generally destroyed when the plants were rely damaged.—Imp. Coll. Field Stat., Sunning- and Plant Path. Lab., Harpenden.

Succulents.

(*See also* 742m.)

. RÜNGER, W.
Über den Einfluss der Temperatur und der Lichtintensität auf die photoperiodische Reaktion und die Blütenentwicklung von *Kalanchoë blossfeldiana* Poellnitz cv. Tom Thumb. (**The effect of temperature and light intensity on the photoperiodic reaction and flower development of *Kalanchoë blossfeldiana* var. Tom Thumb.**)
Gartenbauwiss., 1955, **2**: 485-504, bibl. 17, illus.

xperiments with *Kalanchoë* variety Tom Thumb the s were kept at several temperatures in long-day hours) and short-day (10 hours) conditions. In her short nor long days at 10° C. was flower forma- induced. Above 10° C. the short-day effect cased up to 20° C. and then decreased. Inhibition lower formation in long days was weak at 10° C. became stronger as the temperature was raised. number of flowers formed after the inductive t-day period increased with increasing temperature to 15° C. in both long and short days. The in- scence became apparent most quickly at 20° C. flowering was earliest at 25° C.—Inst. Zierpfl., Hochsch., Hannover.

Roses.

(*See also* 672, 677, 742o.)

5. STREETS, R. B.
Rose growing in Arizona.
Bull. Ariz. agric. Exp. Stat. **276**, 1956, pp. 38, bibl. 25, illus.

The traditional methods of growing roses require certain modifications in Arizona, where very high summer temperatures and alkaline soils are of common occurrence. At high altitudes winter injury is also a problem. The author discusses the planting and care of roses under these conditions and provides separate lists of heat-tolerant and winter-hardy varieties. The commoner diseases and pests are also described.

716. LUNDSTAD, A.
Forsøk med sorter av klaseroser II. (**Variety testing of cluster roses II.**) [English summary ½ p.]
Forskn. Landbruk., 1956, **7**: 441-57, bibl. 4.

In addition to trials on 61 polyantha, polyantha hybrid and floribunda varieties reported earlier (*H.A.*, 26: 2025], a further 57 varieties and 4 that had been included in the earlier trials were compared at Vollebekk in 1953 and 1954. Data are recorded on growth, flowering dates and flower yields, colour and scent. The 10 best varieties in these new trials were Baronesse Manon, Danish Gold, Fanal, Fru Inge Poulsen, Gertrud Westphal, Heidemarie, Käthe Duvigneau, Masquerade, Poulsen's Copper and Vogue.

717. LUNDSTAD, A.
Forsøk med dyrking av 12 rabattrosesorter i stor nedbør. (**Trials with 12 border rose varieties under conditions of high rainfall.**)
Årsskr. PlSkoledr. Dendrol., 1956, pp. 21-8, bibl. 5.

The effect of heavy rainfall on the flowering of 12 rose varieties was assessed during the period 1951–53 by comparing covered and exposed plants. Damaged flowers were liable to be attacked by grey mould (*Botrytis cinerea*). Varieties differed greatly in their susceptibility to black spot (*Diplocarpon rosae*), the disease causing much less damage in covered than in exposed plants. The trials were carried out in Hordaland by the Norwegian College of Agriculture.

718. CHING, F., HAMNER, C. L., AND WIDMOYER, F.
Air-layering with polyethylene film.
Quart. Bull. Mich. agric. Exp. Stat., 1956, **39**: 3-9, illus.

Queen Elizabeth roses, normally a difficult subject, were air-layered with damp sphagnum moss placed around ringed one-year-old stems and covered with polyethylene film. The most desirable roots were formed by soaking the moss in 100 p.p.m.-NAA overnight before use. The same concentration temporarily inhibited shoot growth but not root growth after the young plants were severed and transplanted. No apparent differences in rooting occurred when black polyethylene was used instead of white, although higher temperatures were recorded under the dark film.
J.R.L.

719. LUNDSTAD, A.
Forsøk med lagring av roseplanter. (**Storage trials with rose plants.**) [English summary ½ p.]
Reprinted from *Årsskr. PlSkoledr. Dendrol.*, 1955, pp. 16, bibl. 7.

Tying rose plants in bundles and packing them in boxes with sphagnum moss proved as satisfactory as, and required much less space than, heeling in the plants in a cellar. Of the storage temperatures tested +1° C. gave the best results, −1° C. causing frost damage and higher temperatures combined with high humidity encouraging rot fungi. The degree of wood maturity in the autumn, a varietal characteristic, was found to affect the amount of damage caused by rot fungi during storage. The trials were carried out from 1951 to 1954.—Inst. Dendrol. Nursery Management, agric. Coll. Norway.

720. Kohl, H. C., Jr.
Intermittent mist as a cultural practice for roses grown for cut-flower production.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 534-8, bibl. 5.

Better Times and Red Delight roses were grown in a greenhouse with and without intermittent mist. The mist was applied for 10 seconds in each minute, for 2 hours each day during the winter and for 9 hours each day during hot weather. Night temperatures were kept at 60° F. and light intensity regulated by shade to a maximum of 5,000 f.c. The most-grown plants produced fewer flowers of better quality than the controls, owing probably to the lower temperatures in the mist chamber. Mist also proved a good preventive measure against powdery mildew and appeared to reduce two-spotted mite infestation. The water used for misting left only a light deposit on the leaves, but it seems likely that water containing high concentrations of salts that precipitate easily would leave objectionable residues.—Univ. Calif., Los Angeles.

721. Carpenter, W. J., and Watson, D. P.
Growth of greenhouse roses as affected by mulches and mixtures of ground corncobs.
Amer. Rose Annual, 1955, pp. 45-54, from abstr. in *Nat. hort. Mag.*, 1956, **35**: 181.

In experiments on greenhouse roses ground corncobs were added as a 2-in. or 4-in. mulch and also incorporated with the soil. Soon after application there was a reduction in the nitrogen level of the soil of all treatments, which, in turn reduced the amount of linear growth early in the experiment, but after a period of eighteen months the greatest growth was found in treatments where 2-in. and 4-in. mulches were used. There was a substantial increase in the number of flowers with all treatments, the best yield resulting from the 4-in. mulch.—Mich. St. Univ. J.R.L.

722. Čikalov, P. M.
The importance of young shoots for obtaining high yields of essential oil bearing roses. [Russian.]
Agrobiologija, 1956, No. 3, pp. 130-3.

The Red Crimean rose, developed from *Rosa gallica*, when correctly cultivated can yield up to 100 cwt./ha. of petals containing 0·1–0·15% oil. Experimental results are presented showing that to obtain the maximum amount of young flowering wood new shoots should be pinched or cut back at 120–130 cm. above the ground and old and dry wood should be removed immediately after harvest.

723. (Fink, H. C.)
Crown gall of roses.
Flor. Exch., 1956, **127**(9): 42.

Captan effectively protected rose plants from crown gall bacteria. Streptomycin sulphate also showed promise but was phytotoxic at the concentration used. —Pa St. Univ., Univ. Park.

Other trees and shrubs.

(*See also* 27, 676, 742a, d, e, g-i, l, n, p, u, w, 743c, e, h, 743k, o, p, 959.)

724. Roads Beautifying Association.
Standard specification for supply, preparation of ground, planting and staking of trees and shrubs for roadside planting.
[*Publ.*] *Roads beautif. Ass.*, undated, pp. 6 (cyclostyled).

General notes on recommended types of planting material and planting procedures for use in Britain are followed by lists showing a sample selection of species, classified as regards height and rate of growth, and including details of the dimensions of nursery stock which should be planted to produce bush, feathered or standard trees.

725. Plumridge, A. J.
Raising native shrubs and trees from seed.
J. Agric. Vict., 1956, **54**: 445-8, illus.

Brief notes are given on raising plants of the following Australian genera from seed: *Acacia*, *Boronia*, *Callistemon*, *Callitris*, *Calothamnus*, *Eucalyptus*, *Grevillea*, *Hakea*, *Melaleuca*, *Pittosporum*, *Tristania*, *Hardenbergia*, *Kennedya* and *Sollya*. J.R.L.

726. Floor, J.
Proeven met stekken onder waterverneveling. (**Experiments with cuttings under mist propagation.**) [English summary ¼ p.]
Meded. Inst. Vered. Tuinbouwgew. **73**, 1956, pp. 19, bibl. 6, illus.

In many cases woody ornamentals rooted better under mist in a glasshouse than under double glass without mist; differences were very marked with *Lonicera* and *Erica*. *Chaenomeles* spp., however, showed better rooting under double glass than under mist. The survival of *Berberis* and *Erica* under mist in a glasshouse was much better than under mist in a frame. In general, however, there was little difference in rooting between mist propagation in the glasshouse and in the frame, except for *Ilex verticillata*, which rooted better in the glasshouse, and *Ligustrum*, which rooted better in the frame. Good rooting was also obtained with mist under a plastic tent, and cuttings kept fresher under these conditions. Overwintering after rooting under mist was not a problem. It is recommended that quick-rooting species should be placed under continuous mist, while interrupted mist is preferable for slower-rooting species. Cuttings of *Tilia europaea* "Koningslinde" gave high rooting percentages both in the glasshouse and in the frame, but the type of cutting and the time it was taken were important. Growth hormone treatment accelerated rooting. A new mist nozzle is also described.

727, Snyder, W. E., and Hess, C. E.
Low temperature storage of rooted cuttings of nursery crops.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 545-8.

Rooted cuttings of *Teucrium chamaedrys* were stored essfully in closed polyethylene bags at 34° F. for 167 days on an experimental basis and for 61 days commercial nursery operation. There were no ficant differences between cuttings stored bare-root cuttings stored with their roots packed with gnum or vermiculite. The stored cuttings made equent growth equal to that of cuttings which had potted and kept under glass at 40° F. Storing ngs at 31° F. proved completely unsatisfactory. ed cuttings of *Taxus cuspidata* were also stored essfully in polyethylene bags when kept at 39° F., cuttings of *Juniperus communis hibernica*, *Thuja entalis pyramidalis* and *T. o. globosa*, similarly d at 31, 35 and 39° F., did not grow as well as d plants held in a greenhouse.—Cornell Univ., a, N.Y.

Hammer, A. L.
Insect control for ornamental plants studied.
Miss. Fm Res., 1956, **19**(4): 7.

llent control of azalea bark scale was obtained 1 application of 2 lb. parathion 15% w.p. or 4 lb. thion 25% w.p. in 100 gal. made in late spring. ea scale on camellias 2 applications 2 weeks apart necessary.

Sealy, J. R.
A new hybrid *Aesculus*.
J. roy. hort. Soc., 1956, **81**: 420-3.

escription is given of *Aesculus dallimorei*, which sidered to be a periclinal chimaera from *A. hippo-num* and *A. octandra*. It is likely to prove a decorative tree.

Böhm, O.
Bemerkungen zur Lebensweise und Bekämpfung der Buchsbaumgallmücke (*Monarthropalpus buxi* [Lab.]). **(Observations on the biology and control of the boxwood gall midge.)** [English summary $\frac{1}{3}$ p.]
PflSch. Ber. Wien, 1956, **17**: 44-52, bibl. 12.

x, Pestox III H, and parathion gave effective ol of the leaf-mining midge. The best time to applications is at the peak of the flying period, nd spray being applied 10–14 days later. Gesarol [DDT] is only effective against the adults and be applied at the start of the migratory period.

Griffiths, A., Jr.
Culture and classification of *Camellia* and related genera.
A.R. Fla agric. Exp. Stats, 1955, p. 111.

of *Camellia japonica* retained its viability for r at 40° F., when it was stratified under open, conditions, or when it was stored in air-tight, onditions, but not when it was stratified under air- moist conditions.

Nádasi, M.
Adatok a *Cotinus coggygria* Scop. ivaros és ivartalan szaporításához. **(Data on the sexual and vegetative propagation of *Cotinus coggygria*.)** [Russian and German summaries 13 and 12 lines.]
Agrártud. Egy., 1954 (issued 1956), **18**(2, part 2): 118-25, bibl. 1, illus.

est results were obtained with layering, with soft cuttings from plants forced under glass and with collected early in July and sown 2–3 days later ol frames.

733. Fisher, H. H.
A hardy eucalyptus.
Nat. hort. Mag., 1956, **35**: 129-31, illus.

E. niphophila, planted in the open at Glenn Dale, Md, in 1949, has survived temperatures down to −1° F. with little injury. The 24 most frost-resistant species growing at the U.S. Plant Introduction Garden, Chico, Calif., are listed, with notes on their response to temperatures of 12° and/or 17° F. J.R.L.

734. Suszka, B.
Rodzaj *Forsythia* Vahl. w Arboretum Kórnickim. **(The genus *Forsythia* at the Kórnik Arboretum.)** [English and Russian summaries $\frac{3}{4}$ p. each.]
Arbor. Kórnickie,* 1955, **1**: 91-110, bibl. 11, illus.

Known hybrids of *Forsythia* and others recently developed at Kórnik are listed. Species and varieties in the Arboretum are described with special reference to frost resistance. *Forsythia ovata* and *F. europaea* growing on dry, sandy soils were completely frost resistant and under these conditions even the very tender *F. viridissima* survived the severe winter of 1953–54 almost undamaged.

735. Cathey, H. M.
Het verbreken van de winterrust bij forsythia door warm water en chemicaliën. **(On dormancy breaking of forsythia by hot water and chemicals.)** [English summary $\frac{1}{4}$ p.]
Meded. Dir. Tuinb., 1956, **19**: 768-73, bibl. 12.

The breaking of dormancy at different stages was studied with branches of *Forsythia × intermedia spectabilis*, using a hot-water bath and several chemicals. When dormancy was deepest (late October/early November) treatment for 12 hours at 30° C. resulted in maximum flower development. In December the optimum period was 3–6 hours and in January it was 3 hours. Treatments longer than the optimum resulted in death of the flower buds, leaving only vegetative buds to develop. Shorter treatments in a water bath at 40–45° C. were also effective in breaking dormancy, but the margin of safety became progressively less as the temperature was increased. Branches cut in November which were stored for 20 or 30 days at 0·5° C. and then given hot-water treatment (30° C. for 24 hours) gave 41·2% and 60% open flowers respectively. Sodium azide (at 10^{-2} M) applied to branches cut on 24 November was the only chemical tested which promoted flowering. It had no effect on branches which had received additional artificial cooling.—Lab. Tuinbouwpl., Wageningen.

736. Trocmé, S., and Picard, M.
Recherches sur les variations du coloris des fleurs d'hortensia. **(Studies on colour variations in hydrangea flowers.)**
Ann. agron., 1953, **4**: 959-61, bibl. 1.
Trocmé, S.
Facteurs intervenant dans le coloris des fleurs d'hortensias. **(Factors affecting the colour of hydrangea flowers.)**
Rev. hort. Paris, 1956, **128**: 1511, bibl. 5.

In tests with varying levels of nutrients the plants given no nutrient solution were poorly developed and had blue flowers, when the pH at the start of forcing was 5·0 to 5·5. When phosphate only was given and the pH was the same the plants had pink flowers. Normal fertilization (0·13 N, 0·10 P_2O_5, 0·14 K_2O g./l. twice a week) gave blue flowers, but with double strength or N alone pink flowers with slight blueness were produced. Leaf analysis showed that pink-flowered plants had higher nutrient contents than blue-flowered plants. In the second article the author reviews some recent results, including his own, on factors affecting hydrangea colours and makes practical recommendations.

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* Formerly *Prace Zakl. Dendrol. Pomol. Kórniku.*

737. Kiplinger, D. C., and Nelson, K. S.
Hydrangea color is affected by fertilizer applications.
Ohio Fm Home Res., 1956, **41**: 46-7.
Fertilizer affects color of hydrangeas.
Flor. Exch., 1956, **127**(5): 11, 13.

Trials have shown that when high P applications are made during the forcing season the P combines with Al and thus nullifies the effect of Al in producing blue flowers. Application of N during forcing to prevent N starvation symptoms may also sometimes result in pink or purple flowers. In such cases the desired blue colour can be obtained without any symptoms of N starvation if N is applied once a month throughout the forcing season and aluminium sulphate applied 5 to 7 times during the same period. In areas where the soil is acid pink flowers may be obtained if a fertilizer high in P is used throughout the year to tie up the Al occurring in the soil and if alkaline forms of N are used to prevent decreases in soil pH.

J.R.L.

738. Brierley, P., and Lorentz, P.
Detection and transmission of hydrangea ringspot virus.
From abstr. in *Phytopathology*, 1956, **46**: 466.

Hydrangea ringspot virus is transmissible by manual methods and by the cutting knife but apparently not through seed. When extracted from ageing leaves in January, the virus withstood heating for 10 minutes at 70° C., dilution to 10^{-3}, and ageing for 12 days at 20°. It was found in all 9 commercial varieties of *Hydrangea macrophylla* tested. Two newer varieties, Sainte Therese and Todi, were found only partially infected. Some florists believe that hydrangea varieties "run out". Hydrangea ringspot virus is the only known virus of this species sufficiently prevalent to have a role in the decline of varieties. Tomato ringspot virus occurs infrequently in hydrangea, but it is more damaging than is hydrangea ringspot virus. No evidence was found that tomato ringspot virus is carried either on the cutting knife or through seed.

739. Carpenter, W. J.
The influence of plant hormones on the abscission of poinsettia leaves and bracts.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 539-44, bibl. 6.

In December two batches of poinsettia plants of the variety Improved Albert Ecke were transferred to a laboratory, in which conditions resembled those found in a house. One batch of plants was vigorous, the other rather smaller owing to shortages of water and fertilizer during their early development. On December 20 the following 3 hormone sprays were applied at 2, 4 and 6 p.p.m. to the leaves and bracts at 3 ml. per plant: (*a*) 2,4,5-TP (triethanolamine salt of 2,4,5-trichlorophenoxy propionic acid); (*b*) 2,4,5-TA (2,4,5-trichlorophenoxy acetamide); and (*c*) 2,4,5-TPa (2,4,5-trichlorophenoxy propionamide). A fourth group of plants was left untreated. The most effective compound for reducing leaf and bract losses was 2,4,5-TA. This was especially marked with the 6 p.p.m. concentration, which caused the vigorous batch of plants to retain half their leaves and bracts for 42 days. 2,4,5-TP showed some slight benefit for 3 weeks, but none thereafter. 2,4,5-TPa tended, if anything, to accentuate dropping.—Kans. St. Coll., Manhattan, Kans.

740. Tod, H.
High calcium or high pH? A study of the effect of soil alkalinity on the growth of rhododendron.
J. Scottish Rock Gdn Club, 1956, Vol. **5**, Part 1, reprinted as *Misc. Publ. Edinb. Coll. Agric.* **164**, 1956, pp. 8, bibl. 6.

Seedlings of *Rhododendron davidsonianum* were grown in an acid soil compost, with a pH of 4·7, and in the same compost with 2 levels of magnesium carbonate added to raise the pH to 6·8 and to 8·4. Analysis of the plants grown at the high pH levels showed their general mineral status to be within the range found in plants grown under normal conditions. In growth they showed no serious ill effects such as would have occurred if the rise in pH had been due to calcium.

741. Wells, J. S.
Problems of the rooting of *Taxus*.
Amer. Nurserym., 1956, **104**: 15-16, 83-6, illus.

The best results in rooting *Taxus* were obtained by taking cuttings, 8–10 in. long, of young mature wood with a number of young side shoots. Wood fairly large in diameter and 2- to 3-years-old often rooted more readily than current season's wood. Cuttings could be taken in April, if 2- to 3-year-old wood was used; good rooting was obtained in flats in a hotbed. Wounding was not of value. Sharp sand was the best rooting medium. Treatment of the cuttings with an IBA dust accelerated rooting and improved the root system. Watering copiously until rooting started gave good results when drainage was good. Cuttings taken when frozen and immediately trimmed and inserted rooted better than those allowed to thaw before insertion. Well-rooted cuttings were successfully overwintered by plunging them in an outdoor frame covered with a 50% lath shade.

Noted.

742.
a Ball, E.
Growth of embryo of *Ginkgo biloba* under experimental conditions. I. The origin of the first root of the seedling *in vitro*.
Amer. J. Bot., 1956, **43**: 488-95, bibl. 15, illus.

b BASTIA, C. M., AND PANIGRAHI, G.
Spontaneous variegated chimaera in *Dianthus chinensis* L.
Curr. Sci., 1956, **25**: 300-1, bibl. 4, illus.

c BENSA, S.
I danni del gelo alla floricultura e nei giardini in Riviera. **(Frost injury in floriculture and in Riviera gardens.)**
Riv. Ortoflorofruttic. ital., 1956, **40**: 222-54, illus.
Symptoms in carnations and many other species.

d BIAŁOBOK, S.
Wiśnie ozdobne w Arboretum Kórnickim. **(Ornamental cherries at the Kórnik Arboretum.)** [English and Russian summaries 9 lines each.]
Arbor. Kórnickie,* 1955, **1**: 61-90, bibl. 14, illus.
Notes on varieties and species introduced from the Far East and hybrids raised at Kórnik.

e BLANKWAARDT, H. F. H.
De populierenscheutborder (*Epinotia* (*Gypsonoma*) *aceriana* Dup.). **(The poplar shoot borer.)** [English summary ¾ p.]
Meded. Inst. toegep. biol. Onderz. Natuur **22**, 1955, pp. 8, bibl. 2, illus.
Life history and control with 0·1% DDT.

f BOUSCARY, A.
L'identification des variétés d'oeillets cultivés pour la fleur coupée. **(The identification of carnation varieties grown for cut flowers.)**
Ann. Soc. nat. Hort. Paris, 1956, **2**: 189-203, illus.

g BROWICZ, K., AND BUGAŁA, W.
Rzadkie drzewa i krzewy w Arboretum Kórnickim. **(Rare trees and shrubs at the Kórnik Arboretum.)** [English and Russian summaries 1 p. each.]
Arbor. Kórnickie,* 1955, **1**: 111-28, bibl. 18, illus.
Asimina, *Cedrela*, *Clerodendron*, *Euptelea* *Evodia* and *Parrotiopsis* spp.; characters and hardiness.

h BUGAŁA, W.
Lilak ottawski (*Syringa prestonae* McKeley) i jego odmiany. **(The Ottawa lilac *(Syringa prestonae)* and its varieties.** [English and Russian summaries ¾ p. each.]
Arbor. Kórnickie,* 1955, **1**: 131-41, bibl. 4, illus.
Seven varieties described.

i CHEEMA, G. S.
Seed variations in frangipani *(Plumeria acutifolia).*
Indian J. Hort., 1956, **13**: 24-5.
Seedlings of a single parent show great variation.

j CLOUTIER, B.
Production de l'oeillet sous verre. **(Growing carnations under glass.)**
Rev. d'Oka, 1956, **30**: 117-32.
In Canada.

k (COHEN, G.)
Le froid de février 1956 sur la Côte d'Azur. **(The frost of February 1956 on the French Riviera.)**
Rev. hort. Algér., 1956, **60**: 136-7.
Brief notes on damage to ornamentals.

l CROSBY, T. S.
Further observations on doubtfully hardy shrubs at Wye College.
J. roy. hort. Soc., 1956, **81**: 415-20, bibl. 2.

m DEERING, R. B.
Drought-tolerating ornamentals.
Calif. Agric., 1956, **10**(9): 15, illus.
Found suitable for California.

n DOUGLAS, J., AND BIMANTORO, R. R.
Identification of the *Corypha* palms which flowered in the Hortus Bogoriensis during 1953 to 1955.
Ann. bogor., 1956, **2**: 137-45, bibl. 10, illus.
Descriptions of *C. elata* and *C. umbraculifera*.

o FISCHER, H.
Rosenkrankheiten. **(Rose diseases.)**
Flugbl. biol. Bundesanst. Braunschweig **78**, 1956, pp. 12, illus.
Pathogenic and deficiency diseases and their control.

p (FISHER, H. H.)
Tree for to-day.
Agric. Res. Wash., 1956, **5**(1): 12, illus.
Carpinus tschonoskii recommended for town planting.

q FOOTTIT, R. L. C.
Growing freesias.
Agriculture, Lond., 1956, **63**: 276-9, illus.
A successful grower describes his methods.

r GERLACH, C. S.
Ornamental vines for Michigan.
Misc. Ser. Circ. Mich. St. Univ. **E-3**, 1955, pp. 15, illus.
General notes and descriptions of species.

s GODAN, D.
Die Veilchenblattrollmücke und ihre Bekämpfung. **(Violet leaf midge and its control.)**
Gartenwelt, 1956, **56**: 309-10, illus.
See *H.A.*, 26: 1992.

t HALSEY, H. R.
The *Zoysia* lawn grasses.
Nat. hort. Mag., 1956, **35**: 152-61.
Characteristics of *Z. japonica*, *Z. tenuifolia* and especially *Z. matrella*.

u HANGER, F.
Rhododendron (Moonshine *g.*) 'Bright'.
J. roy. hort. Soc., 1956, **81**: 486-7, illus.
A new yellow-flowered hybrid raised at Wisley.

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* Formerly *Prace Zakl. Dendrol. Pomol. Kórniku.*

v HOLTTUM, R. E.
On the identification of the common hedge-bamboo of south-east Asia.
Kew Bull., 1956, No. 2, pp. 207-11, bibl. 15.
Reasons for preferring the name *Bambusa glaucescens* to *B. nana*, *B.* (*Arundo*) *multiplex*, etc.

w HONDELMANN, W.
Die winterharten Gartenheiden. **(Winter-hardy garden heaths.)**
Dtsch. Baumsch., 1956, **8**: 97-102, 146-52, 161-73, bibl. 11, illus.
Varieties of *Erica* and *Calluna* described and evaluated.

x JOHNSON, B. L., AND BARNHART, D.
Transfer of mosaic resistance to commercial varieties of *Matthiola incana*.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 522-33, bibl. 14, illus.
Breeding and genetical studies.

y JOHNSTON, C. J. R.
Pests and diseases of lawns.
J. Agric. Vict., 1956, **54**: 393-7, illus.
Mainly insects and their control with DDT, BHC, lead arsenate or dieldrin.

z KERR, A.
Factors influencing the development of brown patch in lawns of *Sagina procumbens* L.
Aust. J. biol. Sci., 1956, **9**: 332-8, bibl. 8, illus.
Temperature and humidity conditions encouraging attack by *Pellicularia praticola*.

743.

a KÖSTER, P.
Salzschäden in Zierpflanzenkulturen. **(Salt damage to ornamental plants.)**
Gartenwelt, 1956, **56**: 258-9, illus.
Damage to cyclamen and chrysanthemums described and discussed.

b KRISTENSEN, H. R.
Virussygdomme hos liljer. **(Virus diseases of lilies.)**
Horticultura, 1956, **10**: 116-21, bibl. 29, illus.
Three main diseases described with notes on producing clean plants.

c KRÜSSMANN, --.
Bericht über Winterschäden an Ziergehölzen im Bundesgebiet. **(Report on winter damage to ornamental shrubs in western Germany.)**
Dtsch. Baumsch., 1956, **8**: 239-43.
Tabulated data on deciduous shrubs, conifers and rhododendrons.

d LEHMANN, E.
Anagallis grandiflora hort. und der Formenkreis der mediterranen Art *Anagallis monelli* L. **(*Anagallis grandiflora* and the group of the Mediterranean species *Anagallis monelli*.)**
Gartenbauwiss., 1955, **2**: 427-47, bibl. 45, illus.
Various forms and garden introductions.

e LONGENECKER, G. W.
Landscape plants that invite birds.
Circ. Univ. Wis. Ext. Serv. **514**, 1956, pp. 8, bibl. 11.
Trees, shrubs and creepers.

f MAHLSTEDE, J. P.
Polyethylene in plant propagation.
Amer. Nurserym., 1956, **104**(5): 13-14, 84-92, illus.
American experience with tents, frame covers, etc., discussed.

g MAJUMDAR, G. P.
Adventive leaf-buds of *Eranthemum bicolor*.
Proc. Indian Acad. Sci., Sect. B, 1956, **44**: 57-60, bibl. 16, illus.
E. bicolor suitable material for studying shoot bud initiation with hormones.

h MALLINJOUD, H.-M.
Contribution à l'étude des causes du dépérissement du platane. **(A contribution to the study of the causes of degeneration of plane trees.)**
Rev. hort. Paris, 1956, **128**: 1512-15, bibl. 5, illus.
Pests, diseases and mishandling, with remedies.

i MILLIKAN, C. R.
Diseases of turf.
J. Agric. Vict., 1956, **54**: 397-400, illus.
Fungi, algae and slime moulds and their control.

j MORETON, B. D.
Modern methods of insect pest control.
Park Administ., 1956, **21**: 261-3.
With particular reference to ornamentals in public parks.

k NÁDASI, M.
Faiskolai magvak vizsgálata és csemetenevelési kísérletek. **(Seed testing and trials on raising nursery stock.)** [English and Russian summaries 1 and 1½ pp.]
Agrártud. Egy., 1954 (issued 1956), **18**(2, part 1): 65-89, bibl. 1, illus.
Experience on raising 11 woody ornamentals from seed.

l NIESER, O.
Keimfähigkeitswerte von Blumensämereien. **(Germination of flower seeds.)**
Saatgut-Wirtsch., 1956, **8**: 210-12.
Percentages obtained in 1,357 tests covering 43 flower species.

m NIKOLAEVA, M. G.
The biology of *Euonymus* seed germination in connection with its specific characteristics and geographical origin. [Russian.]
Bot. Žurnal, 1956, **41**: 393-403, bibl. 13.
A study of 12 named and 1 unnamed species.

n PAG, H.
Lehmannia marginata als Orchideenschädling. (**Lehmannia marginata as a pest of orchids.**)
Gartenwelt, 1956, **56**: 346, illus.
Metaldehyde baits recommended for control of this slug.

REISAETER, O.
Tre og buskar for Nord-Noreg. (**Trees and shrubs for Northern Noreg, Norway.**)
Årsskr. PlSkoledr. Dendrol., 1956, pp. 29-32, bibl. 4, illus.

SCHENK, H.
Eine wertvolle Koniferen-Neuheit. (**A valuable new conifer.**)
Schweiz. Gärtnerztg, 1956, **59**(40): 5, illus.
A new form of *Taxus baccata fastigiata* named *robusta*.

q STRYDOM, J. C.
Gladiolus.
Fmg S. Afr., 1956, **32**(5): 23-6, 20, illus.
Growth cycle, soils and fertilizers, grades of corms for planting.

r SUSINI, E.
Ulteriori osservazioni dei danni dal gelo su piante ornamentali nella zona di Firenze. (**Further observations on frost injury to ornamental plants in the region of Florence.**)
Riv. Ortoflorofruttic. ital., 1956, **40**: 346-7.
Species classified according to extent of damage.

s WASSCHER, J.
The importance of sports in some florist's flowers. [Dutch summary ⅓ p.]
Euphytica, 1956, **5**: 163-70, bibl. 15, illus.
Carnations, roses, chrysanthemums, azaleas, etc.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

Citrus—general.

(*See also* 18, 54, 364, 838v, w, 839m, 994.)

4. BURKE, J. H.
Citrus industry of British Honduras, Jamaica and Trinidad.
Foreign Agric. Rep., U.S. Dep. Agric. **88**, 1956, pp. 77, illus.

nditions in British Honduras are the best in the ibbean for citrus growing, and high yields of oranges grapefruit are obtained. Total orange production ely to increase as a result of new plantings made large extent on virgin soil cleared from the jungle; ation may be necessary for consistent commercial is. Grapefruit has been the primary citrus crop in aica, but orange production is expected to increase a result of recent plantings. Most Jamaican citrus roduced without irrigation. Orange and grape- yields in Trinidad are low, and lime production been reduced as a result of disease. Information is ided on current production, local consumption, orts and processing.

5. SAMSON, J. A. (EDITOR).
Handleiding voor de citruscultuur in Suriname. (**Handbook for citrus growing in Surinam.**)
Meded. LandbProefst., Suriname **19**, 1956, pp. 77, bibl. 99, illus.

aspects of citrus growing in Surinam are covered. it from Surinam was exported in large quantities he Netherlands after the war, but the quality was r. Since 1949 government aid has been available elp to improve standards.

5. PIÑEIRO, A., AND ZUCCARDI, R. B.
Planificación cítrica de un predio en función de un mapa de suelos. (**Planning a citrus plantation on a farm with the aid of a soil map.**)
Rev. agron. noroeste Argent., 1956, **2**: 153-96, bibl. 1, illus., map.

Using a farm near Tucumán as an example, the authors demonstrate the way in which a soil map can be used to determine the areas on a farm suitable for citrus production and the soil treatments required on the various areas.

Citrus—varieties and rootstocks.

(*See also* 72, 838d, h, k, u, 839b, e, h, i, o.)

747. CROCKER, A. J.
The Beauty of Glen Retreat mandarin.
Qd agric. J., 1956, **82**: 315-18, illus.

Beauty of Glen Retreat is an early or midseason mandarin unsurpassed in quality and commanding a premium in all markets. Good trees in well managed, irrigated plantations will produce up to 18 bushels per tree, with an average of 9 bushels. The trees crop best if pruned and if the fruit is hand thinned. The variety is sensitive to oil sprays. J.R.L.

748. GONZÁLEZ SICILIA, E.
Una nueva variedad de naranjas. (**A new orange variety.**)
Bol. Inst. Invest. agron. Madrid, 1956, **16**: 143-7.

The new variety is a bud sport of Comuna. It resembles Cadena but is earlier fruiting and sweeter than that variety and is provisionally named Cadena Z. Fruit characteristics of these two varieties are compared in detail.

749. CAIYOD, D. T., AND GONZALEZ, L. G.
Outstanding varieties and forms of pummelo, *Citrus grandis* (Linn.) Osbeck, in some towns of Laguna.
HERMOSO, C. E., AND GONZALEZ, L. G.
Idem, in some towns of Batangas.
FRANCIA, F. R.
Idem, in some towns of Nueva Ecija.
Philipp. Agric., 1954, **38**: 57-72, 225-42, bibl. 3, and 320-33, all illus. [received 1956].

These papers give details of the characters and composition of 25 pummelo varieties selected as the best in each of the three districts.

750. D.S.I.R., New Zealand.
Transport of orange seed from the Cook Islands.
A.R. D.S.I.R., N.Z., 1955–56, 1956, p. 16.

Freshly extracted sweet orange seeds kept in good condition for several months when packed in sealed polythene bags.

751. de Mesa, M. U., and Gonzalez, L. G.
Shield budding Valencia orange (*Citrus sinensis* Osbeck) to five kinds of stocks.
Philipp. Agric., 1956, **40**(1): 13-15,* bibl. 5.

Stocks of China, Shekwasha, Bantangas and Szinkom mandarins and calamandarin were budded with Valencia orange. Batangas mandarin showed the highest survival rate and also produced the most leaves and greatest girth in the scions. Batangas mandarin stocks also induced some resistance to scab (*Elsinoe fawcetti*).

752. Russo, F.
Un nuovo e promettente portinnesto per il limone: *Citrus volkameriana* Pasq., altamente resistente alla *Deuterophoma tracheiphila* Petri e alle *Phytophthorae*. **(A promising new rootstock for lemons, *Citrus volkameriana*, highly resistant to *Deuterophoma tracheiphila* and *Phytophthora* spp.)**
Riv. Agrumic., 1956, **1**: 207-23, illus.

Preliminary experiments indicate that *Citrus volkameriana* is highly resistant to both mal secco and gummosis, produces abundant many-seeded fruit and grows rapidly in the nursery. As a rootstock it induces better development and earlier production than sour orange and has shown affinity for the varieties Arancino, Monachello and various clones of Femminello. Further investigation is necessary before it can be recommended for large-scale introduction.

753. Alindada, R. C., and Gonzalez, L. G.
The graft affinity of *Triphasia trifolia* (Burm. F.) P. Wils. with five varieties of citrus.
Philipp. Agric., 1956, **40**(1): 11-12.†

Scions of calamondin (*Citrus mitis*) and pummelo (*C. grandis*) were fairly compatible with *Triphasia trifolia* rootstocks, showing 93% and 77% successful unions respectively. Two mandarins (*C. reticulata*) and calamandarin (*C. reticulata* × *C. mitis*) were incompatible with *T. trifolia*.

754. Zorin, F. M.
Changes due to grafting. [Russian.]
Agrobiologija, 1956, No. 2, pp. 124-5, illus.

At Soči 23 citrus varieties have been grafted into the crown of an unspecified citrus tree. The fruits produced by some of these scions are compared with those of the same varieties produced by normal trees.

Citrus—leaf analysis and nutrition.

(*See also* 227, 838p, s, 839j.)

755. Satō, K., Ishihara, M., and Kurihara, A.
Studies on leaf analysis of fruit trees. IV. Parts 13-15. [Japanese, with English summaries 3 pp.]
Bull. nat. Inst. agric. Sci. Hiratsuka, Kanagawa, Ser. E, 1956, No. 5, pp. 1-64, bibl. 45, illus.

Part 13. Leaf analysis of magnesium, manganese and zinc deficient citrus trees. Leaf samples from 384 citrus groves, in which Mg, Mn or Zn were deficient, were analysed for N, P, K, Ca, Mg, Zn and Mn. The survey suggests that critical levels are 0·20–0·25% for Mg and 20–30 p.p.m. for both Mn and Zn. In Mg-deficient trees the Mg content of old leaves was much lower than that of the current year's leaves. In Mg-deficient leaves there were positive correlations between Mg and N, Mg and P, and, to a smaller extent, between Mg and K, whereas in healthy leaves the correlations between the Mg and N and Mg and K were negative. *Part 14. The effects of various amount of nitrogen, phosphorus and potassium on growth and leaf composition of young persimmon trees in sand culture.* When persimmon trees were healthy the dry weight composition of the leaves was found to be 2·66–2·69% N, 0·14–0·15% P, and 1·44–1·47% K. The leaves and fine roots were the organs most sensitive to changes of N and K and the fine roots to changes of P. Leaf analysis is considered to be the most practicable method of evaluating the nutrient status of persimmons. *Part 15. Studies on the deficiency of mineral nutrients in plum (Prunus salicina), ume (P. mume), loquat and olive.* Deficiency symptoms in seedlings of these trees grown in sand culture were similar to those described in part 12. Values are given for the levels of N, P, K, Ca and Mg found in leaves, which were clearly showing deficiency symptoms. [For earlier papers see *H.A.*, 24: 1208, 25: 2465 and abstract 140.] J.R.L.

756. Girard, —.
Premiers résultats sur le diagnostic foliaire de l'oranger. **(Preliminary results on foliar diagnosis in oranges.)**
Rapp. Serv. bot. agron. Tunis. 1955, 1956, pp. 296-9.

Leaf analyses over a complete growth cycle showed that orange trees in Tunisia needed mineral-N fertilizer at three stages; (1) before spring growth and flowering, (2) immediately after the natural shedding of superfluous fruits, and (3) in early autumn. The need for K was high at the end of flowering, at fruit shedding and at ripening, while P was most needed at the beginning of flowering and at fruit ripening.

757. Embleton, T. W., and others.
Influence of applications of dolomite, potash and phosphate on yield and size of fruit and on composition of leaves of Valencia orange trees.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 183-90.

Results over a 5-year period in a 3×2×2 (dolomite, potash and phosphate) factorial field experiment in a South California Valencia orchard varied somewhat from year to year. Dolomite reduced the N and increased the P content of the leaves but did not increase the Mg. Potash varied in its effect on fruit size. Generally it increased yields. It increased the K and reduced the Ca in the leaves. Phosphate increased yields, reduced fruit size and the percentages of N and K in the leaves while increasing the percentages of P, Ca and Mg.—Univ. Calif., Riverside.

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* Cited as 633-5.

† Cited as 331-2.

758. Embleton, T. W., Jones, W. W., and Kirkpatrick, J. D.
Influence of applications of dolomite, potash and phosphate on quality, grade and composition of Valencia orange fruit.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 191-201, bibl. 32.

Effects of soil applications of dolomite, potash and phosphate were noted in a P-deficient Valencia orange orchard over a period of 5 years. Those of phosphorus were particularly noticeable in fruit and juice quality. They are set out in detail. Dolomite applications tended to increase the percentage of juice in the fruit. Potash applications increased the potash in the juice and peel and reduced the calcium in the peel. They also increased citric acid and reduced the solids/acid ratio in the juice.—Univ. Calif., Riverside.

759. Pratt, P. F., Jones, W. W., and Chapman, H. D.
Changes in phosphorus in an irrigated soil during 28 years of differential fertilization.
Soil Sci., 1956, **82**: 295-306, bibl. 21.

The changes reported in soil P in an irrigated Navel orange orchard include accumulation, movement, redistribution, depletion and chemical transformation. The average loss of P over the 28 years from treatments excluding P was 408 lb. per acre. Throughout the period the fruit crop removed only 85, 32 and 23 lb. per acre from urea-fertilized, cover-cropped and untreated plots respectively.—Univ. Calif., Riverside.

760. Bingham, F. T., and Martin, J. P.
Effects of soil phosphorus on growth and minor element nutrition of citrus.
Proc. Soil Sci. Soc. Amer., 1956, **20**: 382-5, bibl. 18.

Sour orange seedlings and budded lemons were grown under glass in uncultivated soils from P-deficient areas supplied with P at 0, 76, 360 and 900 lb. per acre. Severe Cu deficiency developed at the two highest rates, resulting in reduced growth and very low values for foliar Cu. Pre-treatment of the soil with Cu at 20 p.p.m. did not completely prevent the deficiency symptoms. Uptake of Zn was reduced, but uptake of Fe and Mn were unaffected by heavy P fertilizing. There was a positive growth response to 76 lb. per acre of P with only a slight reduction of foliar Cu.

761. Smith, P. F.
Effects of high levels of copper, zinc and manganese on tree growth and fruiting of Valencia orange in sand culture.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 202-9, bibl. 15, illus.

Young budded Valencia orange trees were grown in outdoor sand culture in bottomless cylinders for 4 years with differing amounts of Cu, Zn and Mn in the culture solution. There was no appreciable effect of the different levels on the above ground portions of the trees. The only effect noticed in regard to fruiting and fruit quality at this early stage was that high Cu depressed yield. Total soluble solids, citric acid, vitamin C and fruit colour were indistinguishable as between the different treatments. Roots were more affected and there was almost complete suppression of fibrous roots when all 3 metals were at the high level.—U.S.D.A., Orlando, Fla.

762. Raciti, G.
Carenza di magnesio negli aranci siciliani. Diagnosi ed esperienze di cura. Nota 1. **(Magnesium deficiency in Sicilian oranges. Diagnosis and curative experiments. 1.)** [English summary 8 lines.]
Ann. Sper. agrar., 1956, **10**: 1581-97, bibl. 35, illus.

Symptoms are described and percentages of Mg, Ca, N, P and K are given for normal and Mg-deficient leaves of 4 orange varieties. Recovery was more rapid in trees each supplied with 250 g. of magnesium sulphate via the soil than in those manured with 250–1,000 g. of magnesium sulphate plus one or more of the major nutrients. Addition of K in sufficient amounts to give a high soil K/Mg ratio tended to enhance Mg deficiency. The application of 1,000 g. of magnesium sulphate per tree as two foliar sprays gave rapid and moderately good results, but not a complete cure. The orange variety Sanguinello had a high Mg requirement. [See also *H.A.*, 26: 2086.]

763. Wallihan, E. F., and Heymann-Herschberg, L.
Some factors affecting absorption and translocation of zinc in citrus plants.
Plant Physiol., 1956, **31**: 294-9, bibl. 3, illus.

Radioactive Zn^{65} was used in studies on the uptake and translocation of Zn in citrus trees, especially from foliar applications. Absorption and translocation both occurred more rapidly in young leaves than in old, but they varied with the concentration of Zn per unit area of leaf, and absorption was more rapid when Zn was applied near the leaf centre than marginally. No differences were observed in absorption and translocation between upper and lower leaf surfaces. The final distribution of applied Zn in the plant was independent of whether it was absorbed by the roots or by the leaves. In soil experiments chelated Zn showed better penetration through the soil than inorganic Zn salts.—Univ. Calif., Riverside.

Citrus—climatic responses and irrigation.

(*See also* 259, 838y, 839 f.)

764. Caprio, J. M.
An analysis of the relation between regreening of Valencia oranges and mean monthly temperatures in Southern California.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 222-35, bibl. 5.

It was found that highly significant temperature differences distinguished regreening years from good-color years, and that the 21-month crop year contained two separate periods of temperature response [see also *H.A.*, 25: 4294]. Cooler-than-normal temperatures during Period I (February previous to bloom through September after bloom—8 months) and warmer-than-after bloom through the August of harvest—10 months) normal temperatures during Period II (November were associated with regreening years. Bloom dates were significantly later in years of regreening than in good-color years. An index of fruit color derived from these data may be useful for predicting regreening many months in advance of its occurrence. This study suggests that the solution of the regreening problem may lie in treatments designed to bring about early maturity of fruit during the first period. [From author's summary.]—Univ. Calif., Riverside.

765. Karmanov, V. G., and Pumpjanskaja, S. L.
Some characteristics of temperature changes in lemon leaves. [Russian.]
Bot. Žurnal, 1956, **41**: 409-16, bibl. 17.

A method of recording temperatures in plant organs automatically by means of a semi-conductive resistance micro-thermometer has been developed. Data obtained on lemon leaves indicated that continuous recordings of leaf-air temperature differences can serve as a measure of transpiration rates. By using this method in conjunction with a hygrometric method it was found that under constant external conditions changes in transpiration were induced by changes in the CO_2 regime of the leaf. An increase in the CO_2 partial pressure both in light and in darkness led to the liberation of CO_2 accompanied by an increase in transpiration. This increase in transpiration only occurred when conditions were favourable for CO_2 accumulation and thus could not occur when plants were grown under uninterrupted illumination, i.e. with their stomata permanently open.

766. Zabala, S.
Daños provocados por las heladas en plantaciones cítricas. **(Frost injuries in citrus plantations.)**
Idia, 1956, No. 100, pp. 7-11.

Damage to leaves, young shoots and graft stems is recorded for orange, lemon, grapefruit and lime varieties following temperature minima of −5° and −3° C. on consecutive days and −7° C. on another day. All the rootstocks survived, even nursery plants, which were more severely damaged than adult trees. Where fruit had not been harvested it rapidly shrivelled and dropped. In general sweet orange was more susceptible than mandarin or sour orange, sometimes suffering from decortication of the trunk. Some sweet limes on sour orange stocks were severely injured.

767. Biological Branch, N.S.W. Department of Agriculture.
Dry stem of Valencia oranges.
Agric. Gaz. N.S.W., 1956, **67**: 257-8, illus.

Drying of the fruit stalk may occur on trees when the supply of water to the fruits is inadequate and development of an abscission layer causes them to become senescent. In the driest areas the fruits become mummified, but in more humid regions stem end rot (*Diaporthe citri*) may develop. Improved growing conditions will reduce losses from the disorder and foliar applications of 2,4-D are suggested in cases where the problem is recurrent. J.R.L.

768. Richards, S. J., and Huberty, M. R.
Use of tensiometers in the irrigation of citrus.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 210-14, bibl. 6.

As a result of a 4-year trial in a Washington Navel orchard, the authors recommend the use of tensiometers for the timing of irrigation applications to maintain soil moisture conditions within narrow limits. —Univ. Calif., Riverside and Los Angeles.

Citrus—flower induction, pollination and fruit drop.

769. Furr, J. R., and Armstrong, W. W.
Flower induction in Marsh grapefruit in the Coachella Valley, California.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 176-82, bibl. 11.

In studies made on adult Marsh grapefruit trees at Indio, California, the approximate percentage of buds in which floral induction had occurred up to different dates was determined in large numbers of buds by ringing and completely defoliating branches at intervals of two or three weeks from early August through December and by subsequently recording the number of floral shoots that appeared on the treated branches in the following February. On trees with a normal crop, floral induction had started by the first of September and progressed at a slightly increasing rate through December. On trees from which the fruit was removed in June, induction had started by early August and the percentage of buds that produced flowering shoots increased markedly during fall and early winter. Girdling the trunks of uncropped trees in August or September greatly increased the rate of floral induction in early fall and winter. The results suggest that the simple ringing-and-defoliating method used in this study is apparently reliable and may prove useful in obtaining information on the time of induction of flowers in citrus. [Authors' summary.]

770. Soost, R. K.
Unfruitfulness in the Clementine mandarin.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 171-5, bibl. 5.

This work at Riverside substantiated the conclusion of Oppenheimer [*H.A.*, 19: 538] that the Clementine is self-incompatible. Fruit and seed numbers set by Rufert orange pollen were significantly lower than those set by pollen from Kinnow, Honey and Kara mandarins and from Pearl tangelo. Fruit shape was flatter when pollen of Rufert orange and Pearl tangelo was used.

771. Coste, A., and Gagnard, J-M.
Étude sur la pollinisation chez le clémentinier. **(Study on the pollination of the clementine.)**
Fruits et Prim., 1956, **26**: 247-52, bibl. 15.

In Misserghin and Monréal clementines two types of flower were observed, viz. normal flowers with elongated buds and straight styles, and abnormal flowers with short buds and forked or reflexed styles. In both varieties the level of self-fertility was low, but in Monréal it was sufficient to make self-pollination economic. Pollinating young buds and abnormal flowers gave a better fruit set than pollinating mature buds. Cross-pollination studies with Misserghin resulted in wide variations in pip number with different pollinators. Cap Naartje tangerines gave the most regular fruit set but increased the number of pips. Dancy tangerine also gave a fairly good set without appreciably increasing pip numbers.

772. BURNAEVA, N. L.
Experiments on supplementary pollination of citrus. [Russian.]
Agrobiologija, 1956, No. 3, pp. 124-8, illus.

Two varieties each of orange, mandarin and lemon were pollinated with mixtures of pollen taken either from one plant, from a number of plants of the one variety, from a number of plants of one species or from a number of plants of different species. Preliminary results of 2 years' work suggest that supplementary pollination of citrus is beneficial. Total yields in all cases and the percentage of mature fruits, weight of individual fruits and sugar content of the juice in many cases were higher than in the naturally pollinated controls.

773. IWASAKI, T.
Observations on the dropping of fruits in some citrus varieties. [Japanese, with English summary 1½ pp.]
Bull. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No. 3, pp. 1–16, bibl. 11.

The physiological fruit drop of 6 varieties of orange was recorded for 3 seasons. Late maturing varieties have two seasons when fruit drop occurs, the first during May to August and the second in October or January and February. The latter is worse after severe cold; in some varieties it may continue until May. No relationship could be found between the time of fruit drop and the number of seeds per fruit. With early maturing varieties only the first period of fruit drop occurs. J.R.L.

774. IWASAKI, T., NISHIURA, M., AND SHICHIJO, T.
Effects of 2,4-D and 2,4,5-T on fruit drop and abscission of stem buttons in some citrus varieties. [Japanese, with English summary 1 p.]
Bull. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No. 3, pp. 17-30, bibl. 27, illus.

2,4-D and 2,4,5-T were tested on late maturing varieties of citrus from 1950 to 1953. With Hyūganatsu-Mikan oranges [*Citrus tamurana*] and grapefruit 20 to 100 p.p.m. applied in November or December reduced fruit drop by 30–79%. With Natsudaidai and Valencia oranges spraying in January or February also reduced fruit drop, but 2 other varieties failed to respond. There was no difference between the results obtained with 2,4-D or 2,4,5-T. The higher spray concentrations caused injury after the end of February, and by May even 20 p.p.m. caused slight curling of the new leaves. For post-harvest use 25 to 100 p.p.m. of the butyl ester of 2,4-D or 2,4,5-T in vaseline is both convenient and effective in preventing button abscission. J.R.L.

775. ERICKSON, L. C., AND HAAS, A. R. C.
Size, yield and quality of fruit produced by Eureka lemon trees sprayed with 2,4-D or 2,4,5-T.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 215-21, bibl. 5.

Sprays used were the isopropyl ester of 2,4-D 8 p.p.m. or the same concentration of the butyl ester of 2,4,5-T. The 2,4-D slightly but significantly increased the yield but only slightly affected fruit growth and quality. At the first harvest the 2,4-D-sprayed fruits were less mature than the controls as shown by their lower juice content. The 2,4,5-T increased fruit size and weight but delayed maturity. It markedly reduced total yield, but because of its effect on size it raised the proportion of early picked fruit. It decreased the loss of fruit buttons after ethylene treatment in store. The excessive fruit growth stimulation by 2,4,5-T resulted in fruits that were immature when they reached the desirable picking size.—Univ. Calif., Riverside.

Citrus—diseases and pests.

(*See also* 346u, 838b, c, e, i, l-n, t, x, 839d, g, i, l, p.)

776. SCHNEIDER, H.
A new disorder of Eureka lemon trees.
Citrus Leaves, 1956, **36**(9): 8, 33, illus.
Calif. Citrogr., 1956, **41**: 387, illus.

Some trees of Frost nucellar Eureka on sweet orange showed external symptoms of stunting, yellowing foliage and partially defoliated branches. Examinations of the bud-union phloem showed extensive sieve-tube necrosis below the bud union.

777. KNORR, L. C., REITZ, H. J., AND REYNOLDS, F. J.
Occurrence and control of brown rot of citrus fruits on the tree, a disease new to Florida.
Citrus Mag., 1956, **19**(1): 6-9, bibl. 7, illus.

Brown rot of citrus fruit, caused by *Phytophthora* spp., has occurred in Florida since 1951. So far only early and midseason varieties of orange and one grapefruit variety have been found affected. In trials neutral copper fungicides gave very satisfactory control when applied before mid-September. Preliminary results indicated that for good control captan should be used at relatively high rates and immediately before infection takes place. Dithane Z-78 and Vancide 51 appeared to have some merit but cannot yet be recommended. Removal of cover crop growth around trees by mowing or cultivating also helped to reduce losses.

778. RUGGIERI, G.
Mal secco degli agrumi e attuali mezzi di lotta. (**Mal secco of citrus and present control measures.**)
Riv. Agrumic., 1956, **1**: 201-6, bibl. 9, illus., and *Not. Mal. Piante*, 1956, No. 37/38, pp. 169-74, bibl. 9.

Primary infection of young trees of bitter orange occurred only during dormancy, particularly in January, and was more marked in wet than in dry winters. Spraying with 1% aqueous Caffaro four times from Oct. to Jan. reduced infection from 43% to 1·2% without defoliation. Among lemon varieties the Femminello clone Santa Teresa is recommended as resistant and preferable to Monachello. In preliminary work on resistance in rootstocks Cleopatra mandarin and *Citrus volkameriana* show promise.—Staz. sper. Agrumic. Fruttic., Acireale.

779. Fukuda, J., and others.
Studies on effectiveness of systemic insecticides upon some injurious insects of various fruit trees and vegetables. (1.) [Japanese, with English summary 1¼ pp.]
Spec. Rep. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No, 3, pp. 39-69, bibl. 19.

Spray applications of β-fluoroethyl fluoroacetate and monofluoroacetamide were very effective against larvae of the red wax scale (*Ceroplastes rubens*) and also against the adults when applied from September to November. These fluorine compounds were also very effective against 1st and 2nd instar larvae of the arrowhead scale (*Unaspis yanonensis*). β-Fluoroethyl fluoroacetate controlled the larvae of *Pulvinaria aurantii*, but less effectively than did parathion. Both β-fluoroethyl fluoroacetate and monofluoroacetamide were toxic to the citrus aphid (*Aphis citricidus*) and the citrus red mite (*Metatetranychus citri*). Trunk applications to citrus of Systox, schradan, dimefox or β-fluoroethyl fluoroacetate in early spring did not control the red wax or arrowhead scales, but applications of β-fluoroethyl fluoroacetate or Systox to pear trunks gave effective control of pear aphid (*Toxoptera piricola*). Radish seeds soaked in a Systox solution remained free from *Myzus persicae* for 1 week, but the other materials tested were not effective, and some damaged the seeds. Soil watering with Systox or dimefox effectively controlled *Myzus persicae* on cabbages in pots. When radish transplants were watered with Metasystox or schradan in the field *Myzus persicae* decreased markedly until the 36th day after treatment, after which populations started to increase. Cabbages grown for seed and watered with Systox, schradan, dimefox or β-fluoroethyl fluoroacetate were almost free from aphids (*Brevicoryne brassicae*) until harvest; seed germination was not affected.

780. Ela, R. M.
Four insecticide-fungicide combination sprays in the control of some insect pests affecting citrus seedlings in the Philippines.
Philipp. Agric., 1955, **39**: 354-64, bibl. 7, illus.

A bordeaux+DDT spray gave the best control of *Ferrisia virgata* on calamandarin seedlings during the wet season. The various treatments tested had no significant effect on *Aphis gossypii*, *Phyllocnistis citrella* and *Phaneroptera furcifera*. The best seedling growth occurred when bordeaux+DDT was applied 5 times at fortnightly intervals; the growth of seedlings sprayed 10 times at weekly intervals with bordeaux+toxaphene was also good.

781. Di Martino, E.
L'*Otiorrhynchus cribricollis* Gyll. dannoso agli agrumi della Sicilia orientale. (***Otiorrhynchus cribricollis*, a pest of citrus in eastern Sicily.**)
Riv. Agrumic., 1956, **1**: 239-51, bibl. 18, illus.

This nocturnal beetle chiefly attacks young trees, especially in new orchards and nurseries, often killing them within 2–3 years by defoliation. Successful control resulted from dusting the soil over a radius of 1 m. from each trunk with 20 g. of either aldrin or heptachlor containing 6% of the active agent and incorporating the dust to a depth of 6–15 cm. The pest was not checked by foliar spraying with aldrin or heptachlor emulsions.

782. Viado, G. B., Cendaña, S. M., and Rivera, C. T.
Organic insecticides in the control of citrus rind borer.
Philipp. Agric., 1956, **40**: 85-9, bibl. 6.

Endrin gave the best control of citrus rind borer (*Prays endocarpa*) on Szinkom mandarin. On Siamese pummelo EPN and endrin were the most satisfactory materials. Picked fruit had a higher percentage of rind borer infestation than had dropped fruit.

783. Di Martino, E.
Contributo alla conoscenza biologica dell' *Empoasca decedens* Paoli e la fetola da essa prodotta nei frutti di agrumi in Sicilia. Esperienze di lotta. (**Contribution to biological knowledge of *Empoasca decedens* and the fetola produced by it on citrus fruits in Sicily. Control experiments.**) [English summary 1 p.]
Ann. Sper. agrar., 1956, **10**: 1511-52, bibl. 17, illus.

The biology of the insect is described and a list of hosts is given. Citrus trees are infested in winter by adults. In northern Italy the pest is parasitized by *Prenanteon luteiceps* and *Anagrus minimus*. Insecticidal treatments with parathion and barium polysulphide gave negative results. Control was poor with 1% calcium hydrate, fair with 2% or 3% calcium hydrate and good with an aqueous suspension or emulsion of 10%-active DDT at 250 g. per 100 l. The period of effectiveness of DDT was 121 days. [See also *H.A.*, 26: 2106.]

784. (Dippenaar, B. J.)
Concentric ring blotch under control.
Fmg S. Afr., 1956, **32**(6): 9-10, 24, illus.

The occurrence of grey mites (*Calacarus* spp.) on citrus was found to be closely associated with symptoms of concentric ring blotch. The mites can be controlled with lime sulphur sprays.

785. (Fleschner, C. A.)
Soil type and insect population.
Calif. Citrogr., 1956, **41**: 394.

A brief note is given of studies at the University of California in which identical young citrus trees were grown in two soils in an identical greenhouse environment. Trees in one soil consistently had up to ten times as many red mites as those in the other soil.

786. Fukuda, J., and Shinkaji, N.
Laboratory tests of new acaricides on the citrus red mite. [Japanese, with English summary ½ p.]
Spec. Rep. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No. 3, pp. 23-38, bibl. 11.

In tests with new acaricides against *Metatetranychus citri* 2,4-dinitro-6-cyclohexylphenol [dinex] was phytotoxic to younger leaves and at high temperatures, while *p*-chlorophenyl-*p*-chlorobenzenesulphonate [CPCBS] was less effective against advanced stages of the mite. The acetate derivative of dinex was very effective against eggs and adult females and caused less plant injury than did dinex. Its effectiveness decreased in combination with bordeaux mixture. A 2,4-dinitro-*p*-cyclohexylphenyl-acetate formulation was ineffective against all stages of the mite but its effect was increased when applied with dinex-acetate. CPCBS was not effective against mite larvae and adults but had a good ovicidal action, which was not affected in combination with bordeaux mixture. Bis-(*p*-chlorophenoxy)-methane possessed excellent acaricidal properties, but was too expensive; it combined most effectively with CPCBS in the proportion 18 : 7.

787. (BURGER, J. J., MYNHARDT, C. B., AND SCHEEPERS, G.)
The use of diazinon for the control of red spider.
Citrus Gr, 1956, No. 271, p. 1.

In field trials on citrus trees the initial kill of red spider by diazinon was high, but about 6 weeks later mite infestation had again built up to a high level. Diazinon was ineffective against red scale.

788. FUKUDA, J., AND OTHERS.
Studies of the use of a vinyl tent in citrus tree fumigation. [Japanese, with English summary ½ p.]
Spec. Rep. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No. 3, pp. 1-21, bibl. 6.

Comparisons were made between a vinyl tent and a paper tent for use in citrus tree fumigation. The temperature rise in the vinyl tent was similar to that in the paper tent, but the relative humidity was rather higher. No condensation occurred under the vinyl tent in the winter and only a small amount in the summer. Leakage of HCN gas was generally less than through the paper tent. With the vinyl tent about half the usual dosage was required to control the arrowhead and red wax scales in summer, but at temperatures below 6° C. the dosage and duration of treatment had to be increased.

789. SARDO, S.
L'acido cianidrico liquido nella lotta contro le cocciniglie degli agrumi. **(Liquid hydrocyanic acid for control of citrus scale insects.)**
Not. Mal. Piante, 1956, No. 37/38, pp. 217-23.

The beneficial secondary effects of fumigation with hydrocyanic acid include an increase of chlorophyll content and improvement in fruit yield and quality. The advantages of using the liquid form of the fumigant are discussed.—Commiss. gen. anticoccid., Catania.

790. DI MARTINO, E.
La lotta contro le cocciniglie degli agrumi. **(Control of citrus scale insects.)**
Riv. Agrumic., 1956, **1**: 291-8, illus.

Malathion at 125 g. per 100 l. of water gave poor results and at double this concentration its effect was still only moderate. When mixed immediately before use with a 1% emulsion of white mineral oil its action was markedly improved. Parathion at 50 g./100 l. was slightly better than the lower concentration of malathion. At 75 g./100 l. it gave good, but not complete control, the emulsified form being superior to the wettable powder. The same oil emulsion enhanced its action as with malathion. The best results were given by 2% emulsion of the oil used alone. Some fruits were injured by sunlight after treatment with the mixtures or with parathion plus a wetting agent.

791. CARMAN, G. E., AND LINDGREN, D. L.
Evaluation of parathion in California red scale and yellow scale eradication programs.
J. econ. Ent., 1956, **49**: 534-9.

Field tests in 2 citrus growing counties in California revealed the inadequacy of the existing petroleum oil spray treatments for controlling California red scale (*Aonidiella aurantii*) and yellow scale (*A. citrina*). In Riverside county the best treatment against red scale appeared to be a parathion spray followed by 2 HCN fumigations or by a second parathion spray and then an HCN fumigation, in that order. In Tulare county yellow scale responded similarly to an initial parathion spray followed by 2 HCN fumigations.

792. FUKUDA, J., AND KOREMURA, M.
Studies on resistance of citrus varieties to the arrowhead scale, *Unaspis yanonensis* Kuwana. III. On the contents of organic nitrogen compounds, organic acids and inorganic components in the leaves of Natsudaidai attacked by the arrowhead scale. [Japanese, with English summary ¾ p.]
Bull. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No. 3, pp. 109-17, bibl. 9, illus.

It was found that the higher the population of the arrowhead scale on Natsudaidai oranges (a species normally showing resistance) the greater were the amounts of nitrogen compounds in the leaves and the nearer they approached the values found in leaves of the susceptible Satsuma orange. Leaves of Natsudaidai, which were free from scales, contained more organic acids than those that were attacked and 5 times as much as leaves of the Satsuma orange. The higher the scale population on Natsudaidai leaves the greater was the amount of K and the smaller were the amounts of P, Ca and Mg present. J.R.L.

793. CRESSMAN, A. W.
Timing of parathion sprays on oranges.
Calif. Citrogr., 1956, **41**: 406, 408, bibl. 2.

In a Valencia and a Navel orange grove parathion sprays applied at both pre-bloom and post-bloom stages gave good scale control. In both groves there was a crop reduction when sprays were applied too soon after flowering.

794. TAYLOR, O. C., AND OTHERS.
Effect of oil and parathion sprays on orange size and quality.
Calif. Citrogr., 1956, **41**: 452-4, bibl. 6.
Size and quality of oranges as affected by oil and parathion sprays.
Citrus Leaves, 1956, **36**(11): 10-11.

Measurements were taken in 9 Navel and 6 Valencia orange groves which had received parathion or oil sprays for black and red scale control. Size of both varieties was increased by light medium oil but was decreased by parathion. Responses in terms of number of fruits were variable. In fruits sprayed with oil the percentage of total soluble solids in the juice was reduced, the effect being greater with increased size.

Total acid in the juice of oil-sprayed fruits was also reduced. The juice content of oil-sprayed fruits was only slightly higher than that of parathion-sprayed and control fruits, and differences were not significant. Oil-sprayed Valencias showed a delay in colouring, which persisted until harvest. No direct injury to the trees was observed from either treatment.

795. RIEHL, L. A., WEDDING, R. T., AND RODRIGUEZ, J. L.
Effect of oil spray application timing on juice quality, yield, and size of Valencia oranges in a southern California orchard.
J. econ. Ent., 1956, **49**: 376-82, bibl. 14.
Timing oil spray on Valencias.
Calif. Agric., 1956, **10**(10): 3, 12.

The percentage of total soluble solids in Valencia oranges reached a maximum after a single annual application of oil in late summer and a minimum after oil spray applications in March or April. Fruit yields showed a similar trend. Comparisons between Valencia oranges treated with oil sprays in the late summer and those fumigated with HCN and sprayed with a non-oil acaricide showed that (1) differences in the percentages of total soluble solids of the juice were not significant; (2) the adjusted packed-box sum of fruit per tree was greater for oil-sprayed plots than for non-oil-sprayed plots; and (3) the fruits fron oil-sprayed trees were larger.—Univ. Calif., Riverside.

796. FORD, H. W.
Chemicals screened for systemic effects against spreading decline disease of citrus.
Plant Dis. Reptr, 1956, **40**: 861-5, bibl. 2.

A total of 133 chemicals were screened for systemic effects against spreading decline [caused by *Radopholus similis*]. At the present time no material has shown promise based on stimulation of new shoot growth by diseased trees. [Author's abstract.]—Fla Citrus Exp. Stat., Lake Alfred.

797. FLETCHER, F. W.
Telone, the new Dow soil fumigant containing dichloropropene.
Down to Earth, 1956, **12**(2): 6-7.

Telone, containing approximately 95% dichloropropene, is recommended as a general nematocide, especially where meadow and cyst-forming nematodes are a problem. It is considered to be particularly useful for citrus replanting areas, flower and nursery crops, pineapples, tobacco and all kinds of vegetables.

Citrus—fruit harvesting, storage and composition

(*See also* 775, 839a, b, e, k, 839n.)

798. SMITH, R. J.
A picking experiment.
Calif. Citrogr., 1956, **41**: 388, 404, illus.

A report is given of a small-scale test. A low trailer carrying field boxes was pulled through the orchard to keep pace with a picking team of four. The 2 rows adjacent to the trailer were picked so that walking was reduced to a minimum. This method was, in general, appreciably faster than the usual method, in which a trailer is left at one central point.

799. ILDIS, P.
Altérations des pomélos aux températures trop basses. **(Low temperature changes in pummelos.)**
Fruits et Prim., 1956, **26**: 119-23, illus.

Mature pummelos were stored at 0, 4, 7 and 11° C. at an R.H. of 85–90% for 68 days. Rind spotting developed most rapidly on fruits held at 7° C., 100% being affected within 28 days, and least rapidly on fruits held at 11° C. Among the latter 80% showed no breakdown after 68 days storage and all these fruits remained sound for a further 8 days at room temperature. In contrast 30% of the fruits held at 0° C. appeared to be sound after 68 days storage, but all these developed breakdown when kept for 8 days at room temperature. Weight losses were greatest in fruits held at 7° C. and acidity was lowest in fruits held at 0° C.

800. GRIERSON, W., AND NEWHALL, W. F.
Reducing losses in ethylene degreening of tangerines.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 236-43, bibl. 7.

The high losses normally encountered in handling tangerines have been found to be aggravated by: (*a*) ethylene degreening; (*b*) drying in heated polisher-driers; (*c*) an interaction between these two effects. It has been demonstrated that such losses can be reduced by: (*a*) initiating a spot-picking program that reduces the duration of the degreening period needed; (*b*) keeping fully coloured tangerines out of the degreening rooms; (*c*) degreening at as near to 85° F. as possible; (*d*) eliminating the polisher-driers on tangerine lines. It is suggested that degreened tangerines should not be used for packing under premium brands. [Authors' summary.]—Fla Citrus Exp. Stat., Lake Alfred.

801. KAUFMAN, J., HARDENBURG, R. E., AND LUTZ, J. M.
Weight losses and decay of Florida and California oranges in mesh and perforated polyethylene consumer bags.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 244-50, bibl. 6.

The polyethylene 5 lb. consumer package bags had 8, 16, 32 or 64 ¼-in. perforations or 64 ⅛-in. perforations. Weight losses were much less from fruit in all types of film bag than from those in mesh bags. On the other hand the least decay occurred in open mesh bags and the most in the film bags with only 8 ¼-in. perforations. Results of this study indicate that the least decay of film packed oranges will occur if the bags are perforated with 64 ¼-in. holes, that weight loss will not be excessive and shrivelling may be negligible.—U.S.D.A., N.Y., and Beltsville, Md.

802. SAPONARO, A.
Prove sull'azione fungicida di una carta per agrumi inviata dalla Cartiera di Ormea. **(Tests on the fungicidal action of a citrus wrapping paper supplied by the Ormea paper mill.)** [English summary 11 lines.]
Boll. Staz. Pat. veg. Roma, 1955 (issued 1956), **13**: 141-55, bibl. 3, illus.

Papers impregnated with Cequartyl B.E. [composition not stated] inhibited the development of *Botrytis cinerea, Penicillium* spp., *Alternaria* spp. and *Rhizopus* spp. in culture, the last named being the most resistant. Tests with wrapped lemon and orange fruits gave promising results.

803. ANDRADE, A. C., PUZZI, D., AND TORRES, S. C. A.
Experiências para o controle de podridões que ocorrem em limões durante o transporte. **(Experiments on controlling rots affecting lemons during transport.)**
Biológico, 1956, **22**: 99-103.

The predominant moulds in these experiments were *Alternaria citri* and *Diaporthe citri*. Control was better with 1% Shirlan (salicylanilide) than with 1% sodium orthophenylphenate+0·5% Hexamine. A 0·02% solution of 2,4-D was more effective than either. The action of both fungicides was very markedly improved by the addition of 0·02% 2,4-D and significantly enhanced by MCPA at the same concentration. In all treatments the lemons were immersed for 2 min. before washing, drying and packing.

804. YAMADA, S.
Studies on the control of citrus fruit decay in storage. III. Dissemination of common green mold and blue-contact mold on Satsuma oranges. [Japanese, with English summary 1 p.]
Bull. Tôkai-Kinki agric. Exp. Stat. hort. Div., 1956, No. 3, pp. 65-83, bibl. 22, illus.

During 6 years' experiments it was found that the green and blue mould organisms, *Penicillium digitatum* and *P. italicum*, did not infect Satsuma orange fruits before September because the wound tissue healed too rapidly to allow the fungi to enter. It was shown that the primary infection of fruits in store was by infected fruits brought in from the field, and this explained why sterilization of the store before the fruit was taken in was not effective in preventing decay. J.R.L.

805. ORIHUEL, G., AND MERÍ, J.
La reducción del podrido de la naranja mediante los tratamientos con bórax, bórax-ácido bórico y ortofenilfenato sódico-urotropina. **(Reduction of orange moulds by treatments with borax, a mixture of borax and boric acid and a mixture of sodium orthophenylphenate and urotropine.)** [English summary ¾ p.]
An. Edafol. Fisiol. veg., 1956, **15**: 439-92, bibl. 53, illus.

The orange variety Comuna was much more susceptible than Doblefina to moulds caused by *Penicillium digitatum* and to a smaller extent by *P. italicum*. In both varieties the best results, i.e. 82% unaffected fruit after 3 weeks' storage at a mean temperature of 20·94° C. and R.H. 87%, were obtained by a 4-min. immersion in a mixture of 4% borax and 2% boric acid at 43°–46° C. Equally good control was achieved in Doblefina by a 4-min. immersion at 15° C. in a mixture of 2% sodium orthophenylphenate, 1% hexamine and 0·4% sodium hydroxide.

806. VERGANI, A. R.
Esterilización por el frío de frutos infestados por larvas de *Anastrepha fraterculus*, Wied. **(Cold sterilization of fruits infested by larvae of *Anastrepha fraterculus*.)**
Idia, 1956, No. 100, pp. 15-16.

Fruit shipped from Argentina to the U.S.A. is kept at 0·5° C. for 18 days to control the West Indian fruit fly, *Anastrepha fraterculus*. An experiment with artificially infested oranges and peaches showed that 9 days at this temperature after pre-cooling were sufficient to cause 100% mortality of the larvae.

807. COOTE, G. G.
Analysis of scores for bitterness of orange juice.
Food Res., 1956, **21**(1): 1-10, from abstr. in *Abstr. published Paps, C.S.I.R.O.*, 1956, **4**(8), No. 384.

A major problem in canning orange juice is the development of a bitter taste due principally to the presence of limonin. This bitterness is associated with factors such as rootstock, scion, and picking maturity. Hence, experiments have been conducted to compare juices from fruit grown on various rootstock-scion combinations. A panel of tasters using a rating scale for bitterness has made the comparisons. A statistical analysis of the scores has been made. It would appear from the correlations between means and variances that the analysis of transformed panel means would be a little more sensitive than that for untransformed means. Comparison of the analysis for the data for 31 tasters shows, however, that the two methods give remarkably consistent agreement. The data of the experiment gave useful information about the ability of the tasters in estimating bitterness. These results provided a good basis for further training and the selection of an analytical panel large enough for other tests.—Div. math. Statist., C.S.I.R.O.

Dates.

(*See also* 838q.)

808. FURR, J. R., AND ARMSTRONG, W. W.
The seasonal use of water by Khadrawy date palms.
Rep. 33rd annu. Date Grs' Inst., Coachella, 1956, pp. 5-7, bibl. 7.

The consumption of water from the upper 7 ft. of soil, containing 85–88% of the feeder roots, in an 18-year-old block of Khadrawy dates was estimated from the results of frequent sampling of the soil for moisture during 3 years. The rate of use of water was highest in the 2 to 5 ft. zone, which had the highest water holding capacity and the highest root concentration. The seasonal curves of water loss from an evaporation pan and from the upper 7 ft. of soil were similar but varied slightly with the season. The average rate of use of water in June, July and August was three times that during December, January and February. The average yearly use of water from the upper 7 ft. was 51·1 inches.—U.S. Date Field Stat., Indio, Calif.
J.R.L.

809. NIXON, R. W., AND WEDDING, R. T.
Age of date leaves in relation to efficiency of photosynthesis.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 265-9, bibl. 12.

The photosynthetic efficiency of Deglet Noor date leaves, as measured with leaf disk samples in a modified Warburg respirometer, appeared to increase until about the time of full maturity, but thereafter decreased with age. These findings were confirmed by the percentage increase in dry weight of leaf tissue during the day as determined by the half-leaf method, except that the highest values were obtained with the youngest leaves. A possible explanation for this apparent exception is that in the youngest leaves, whose bases were not fully developed, translocation was slower than in fully mature leaves. Leaves 4 years of age were only about 65% as efficient, per unit of area, as those 1 year old. The data provide a background for the formulation of leaf-fruit ratios and a criterion for the evaluation of leaf pruning practices with the date palm. [Authors' summary.]—U.S.D.A., Indio, Calif., and Univ. Calif., Riverside.

810. NIXON, R. W.
Effect of metaxenia and fruit thinning on size and checking of Deglet Noor dates.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 258-64, bibl. 9.

In these studies at the U.S. Date Garden, Indio, Calif., different pollen sources and different levels of thinning were tried. The data indicate that the effects of pollen source and fruit thinning are additive. Differences in fresh weight of fruit and in air-dry weight of both flesh and seed due to pollen source were about the same at all levels of thinning. The increase in size resulting from thinning was accompanied by an increase in the amount and severity of checking, but the increase in size due to pollen source was not accompanied by a corresponding increase in checking. This strongly, though not conclusively, suggests that the large fruit produced by pollen source is less susceptible to checking than is that produced by fruit thinning. The data also suggest that growers may be able, by changing to pollen of a different male palm, to get a slight increase in size and quality of fruit without a reduction in yield.

811. NIXON, R. W.
How many fruits per strand should be left in thinning the Medjool date?
Rep. 33rd annu. Date Grs' Inst., Coachella, 1956, p. 17, bibl. 1.

From work carried out on 12-year-old date palms in 1955 it is concluded that thinning to 16 fruits per strand would bring higher returns than thinning to 20 fruits per strand, but lower grades result if the fruit is thinned to 12 fruits per strand. At least 15 to 20% of the fruit drops between thinning and harvesting.—U.S. Date Field Stat., Indio, Calif.

J.R.L.

812. COOKE, R. E.
A study of the relationship of heat units to the ripening time of dates.
Rep. 33rd annu. Date Grs' Inst., Coachella, 1956, p. 13, bibl. 2.

From 20 years' data it has been calculated that from 1 December 6,900 summation heat units are needed to ripen the date. The daily mean temperature is used, and 50° F. is taken as zero, as below this the date palm ceases to grow.—Calif. Date Grs' Ass.

J.R.L.

813. ASHMAWI, H., AREF, H., AND HUSSEIN, A. EL A.
Compositional changes in Zagloul dates throughout the different stages of maturity.
J. Sci. Food Agric., 1956, **7**: 625-8, bibl. 15.

Weekly analyses were made of red-type Zagloul dates during ripening for total solids, reducing and non-reducing sugars, starch, protein, ether extract, tannins and ash. The maturation period was classified into four stages: green, turning, fully coloured and discoloured. During maturation total solids increased while starch, protein and ash decreased. Total sugars increased up to the full-coloured stage and decreased in the discoloured stage. The ratio of reducing to non-reducing sugars varied during maturation.—Cairo Univ.

814. VINCENT, L. E., AND LINDGREN, D. L.
Progress report on control of date insects.
Rep. 33rd annu. Date Grs' Inst., Coachella, 1956, pp. 3-4, bibl. 2, illus.

Dusting trials for two seasons have shown that 4% malathion and 5% chlorthion (0,0-dimethyl-0-4-nitro-3-chlorophenyl thionophosphate) reduce the infestations of nitidulid beetles by about 60% and of pyralid moths by 60-100% on the date varieties Khadrawi and Deglet Noor. In acaricide trials with 5 new dusts only 25% R1303 and 4% FW293 appeared to give as good control of the date mite (*Oligonychus pratensis*) as sulphur dust.—Univ. Calif., Riverside.

J.R.L.

815. RYGG, G. L.
Effect of temperature and moisture content on the rate of deterioration in Deglet Noor dates.
Rep. 33rd annu. Date Grs' Inst., Coachella, 1956, pp. 8-11, bibl. 2.

Deglet Noor dates were stored at temperatures from 0 to 60° F. for periods up to 1 year and at 80° for up to 6 months. "Natural", hydrated, and processed dates over a moderate range of moisture contents were used. Deterioration, as indicated by darkening, loss of flavour, and lowering of pH were more rapid at high temperatures and high moisture contents and slower as these two factors were lowered. The results suggest a maximum storage period of 1 month at 80°, 3 months at 60°, 8 months at 40° and 1 year at 32° or 28°. Dates may be stored considerably longer than 1 year at 0°, but how much longer was not determined. [From author's summary.]—U.S. Dep. Agric., Pomona, Calif.

Macadamias.

816. STROHMAN, R. E.
Equipment for husking and sorting macadamia nuts.
Hawaii Fm Sci., 1956, **5**(1): 4-5, illus.

Details, including photographs, are given of a plate-type husker, a cylinder-type husker and a pneumatic separator developed for use on cured macadamia nuts.

J.R.L.

Olives.

(*See also* 10, 72, 392, 838a, f, j, o, r, z, 839c, p, 999.)

817. Morettini, A.
Alcuni aspetti della biologia dell'olivo e loro applicazioni nel perfezionamento della tecnica colturale. **(Some aspects of olive biology and their application to cultural practice.)**
Stabilimenti Tipolitografici Vallecchi, Firenze, 1956, pp. 24, bibl. 57, illus.

The main points emphasized are: early disappearance of the taproot even in seedling olives; avoidance of deep cultivation; broadcasting and shallow incorporation of fertilizers except where high fixing power of the soil for P or K necessitates deeper placement of these; avoidance of cover crops such as lucerne and sainfoin which have heavy water demands; loss of production following the defoliating action of bordeaux mixture; importance of selecting pollinating varieties for self-incompatibles; attempts to prevent biennial bearing by rational pruning, fertilizing and protection against pests and diseases; improvement of production by clonal selection.

818. Mort, C. H.
Olive tree propagation.
Agric. Gaz. N.S.W., 1956, **67**: 238-42, bibl. 2, illus.

In Australia the best results have been obtained in the nursery by grafting olive varieties on seedlings, especially seedlings of the variety Verdale. Directions are given for raising seedlings, budding and grafting, including root grafting, and also for propagating varieties by cuttings, layers and stools. J.R.L.

819. Anagnostopoulos, P. T.
La printanisation de l'olivier et la germination de ses noyaux. **(Vernalization of the olive tree and germination of its seeds.)**
Fruits et Prim., 1956, **26**: 205-17, biol. 21, illus.

This appears to be a full translation of a Greek paper, an English synopsis of which was received earlier [see *H.A.*, 26: 4116]. Seasonal temperature variations are given in connection with the growth phases of olives in Greece. Varieties are classified according to their need for low temperatures in (1) December and January, (2) December only, (3) neither. In one locality the variety Carydolia A (group 1) produced few flowers and no fruit after a mild January. The importance of low temperatures in the variety Koroneiki (group 2) was demonstrated by keeping plants with half their branches exposed to the weather and the rest protected under glass. Only the exposed braches fruited, winter temperatures having been sufficiently low; the protected branches bore only male flowers. Seeds from half-ripe fruits were sown in November and germinated in 45–50 days. Seeds from ripe fruits were sown in spring and did not germinate until autumn after their dormancy was broken by summer temperatures. Storage of such seeds at 0·2° C. for one month before sowing increased the germination percentage in some varieties and reduced it in others, but did not break dormancy. Whereas branches were vernalized by both low temperature and summer drought, dormant seeds responded to neither condition. Germination of olive seeds after passage through the digestive canals of birds is explained by the relatively high temperature (40° C.) to which they are subjected. Germination is facilitated by breaking the "stone". Dense sowing of vernalized seed under cover in August gave excellent germination.—Superior School Agric., Athens.

820. Anon.
Diagnostic foliaire de l'olivier. **(Foliar diagnosis in olives.)**
Rapp. Serv. bot. agron. Tunis. 1955, 1956, 267-8.

Results of foliar analyses for N, P and K are given from three Tunisian olive groves comparing (1) the effects of fertilizing with mineral N, P and K separately and in all combinations and with dried blood only, (2) varietal differences in response to a green manure, and (3) effects of $(NH_4)_2SO_4$, green manure and farmyard manure. Seasonal variations are compared with those in southern France. Both yield and leaf composition responded very slowly to fertilizing. Surface application of P was ineffective in correcting the P deficiency inherent in Tunisian soils.

821. Ciccarone, A.
Le malattie nutrizionali dell'olivo e i relativi rimedi. **(Nutritional diseases of olives and the corresponding remedies.)**
Not. Mal. Piante, 1956, No. 37/38, pp. 71-89, bibl. 76.

The bearing of nutrition on fungus infection, gummosis, biennial bearing and fruit abnormalities is discussed. Reference is made to deficiencies of K, B and Zn, particularly in connection with leptonecrosis.

822. Boccanera, G.
Ricerche su l'autofertilità delle principali varietà d'olivo coltivate nell'Agro spoletino e risultati di alcune prove d'impollinazione artificiale. **(Research on self-fertility and self-sterility of the principal olive varieties cultivated in the Spoleto district and results of some tests on artificial pollination.)** [English summary 8 lines.]
Ann. Sper. agrar., 1956, **10**: 1281-98, bibl. 12, illus.

As a result of tests covering 3 years self-sterility was proved in Moraiolo, Raja and Ascolana, the first two being also cross incompatible. Suitable pollinators are recommended. An unidentified variety resembling Correggiolo was self-fertile.

823. Velázquez Diaz, J.
Las heladas en los olivos. **(Frosts and olive trees.)**
Bol. Oleic. int., 1956, No. 31, pp. 17-23, illus.

Damage sustained by olive trees in Spain as a result of frosts in Jan.–Feb., 1954, is described. A symptom of severe damage or death was the retention of withered leaves by the tree. Sheltered situations were severely affected. Factors enhancing damage were: (1) immaturity of trees, (2) liberal N fertilizing, and (3) irrigation.

824. Morettini, A.
Come ricostituire gli olivi danneggiati dalle basse temperature. **(How to re-establish olive trees damaged by low temperatures.)**
Ital. agric., 1956, **93**: 457-77, illus.

Very severe frost damage necessitating cutting back to the stump can be diagnosed by decortication and failure to produce growth even from dormant buds. The procedure of cutting back, disinfection and management of suckers produced by ovuli is briefly desctibed. Where damage affects the branches only, drastic pruning and thinning are advised. If only twigs or ends of secondary branches are injured, the affected portions should be cut out and a fungicide applied. No further pruning is advisable until the following spring. All treated trees need supplementary application of quick-acting N, careful pruning, conservation of soil moisture and, in the case of suckers, exclusion of grazing animals.

825. Braconi, L.
Operazioni cesorie negli oliveti danneggiati dal gelo. (**Pruning operations in olive groves damaged by frost.**)
Ital. agric., 1956, **93**: 658-65, illus.

Trees damaged in the trunk are sawn off just below soil level, the cut being slightly oblique. The surface of the stump is coated with a copper-lime fungicide and earthed over, allowing numerous suckers to develop from ovuli, the best being retained for forming the new crown and the remainder removed as rooted cuttings. Where the trunk is undamaged, dead or severely affected boughs or twigs are cut out as soon as their condition is known. Fruiting branches are reduced in number and weak shoots eliminated to hasten full recovery.

826. Georghiou, G. P.
The olive leaf spot and its control.
Countryman, Nicosia, Oct. 1956, p. 8, illus.

Leaf spot (*Cycloconium oleaginum*) is causing severe defoliation of olives in several areas of Cyprus. An experiment at Nicosia in 1955/56 showed that the disease can be satisfactorily controlled by the application of 10–10–100 bordeaux mixture in the second half of October, just before the rainy season begins.

827. Rosa, M.
Prove di lotta contro *Gloeosporium olivarum* Alm. eseguite in provincia di Brindisi nel 1955. (**Experiments on control of *Gloeosporium olivarum* carried out in Brindisi province in 1955.**) [English summary ⅔ p.]
Boll. Staz. Pat. veg. Roma, 1955 (issued 1956), **13**: 193-209, bibl. 10, illus.

In spite of interference by olive fly, the results of fungicidal tests showed satisfactory control of anthracnose by 1·5% bordeaux mixture and 0·3% Perenox. Neither zineb nor captan persisted sufficiently long on the foliage or fruit to give effective control.

828. Graniti, A.
Un biennio di sperimentazione in Sicilia sulla difesa dell'olivo dalla lebbra e dalla mosca. (**Two years' experimentation in Sicily on the protection of olive trees against anthracnose and fly.**)
Not. Mal. Piante, 1956, No. 37/38, pp. 201-6.

Two or three applications of 1 : 1 : 100 bordeaux mixture during September and October satisfactorily controlled *Gloeosporium olivarum*. Combined control of fungus and fly (*Dacus oleae*) required two applications (July and August) of 0·1% parathion followed b two treatments with a combination of bordeau mixture or zineb with 0·03% parathion. A secondar benefit of this treatment was protection of the frui from *Sphaeropsis dalmatica* and *Fusarium* spp.– Ist. Pat. veg. Univ. Catania.

829. Russo, G.
Stato attuale della lotta contro la mosca delle olive (*Dacus oleae* Gml.) (**Present state of control of the olive fly, *Dacus oleae*.**) [One section in French, English summary 1½ pp.]
Not. Mal. Piante, 1956, No. 37/38, pp. 27-50, bibl. 15.

The findings of the international congress (Athen 1955) on this problem are briefly reported. Recon mendations for the use of insecticides are made on th basis of recent investigations in Italy.

830. Mijušković, M., and Mirčetić, S.
Ogledi suzbijanja maslinove mušice parationskim sredstvima na crnogorskom primorju. (**Preliminary results of control tests against olive fly using materials based on parathion.**) [French summary 1 p.]
Zasht. Bilja, 1955, No. 31, pp. 45-59, bibl. 6, illus.

E-605 was applied at 0·06%, 0·08% or 0·1% at th beginning of September and/or the beginning October. The very young larvae were the mo susceptible to the spray. Single sprays at 0·06% ar 0·08% did not give results equal to 2 application At 0·1% E-605 applied in September gave fairly goo results (79·8% mortality of larvae). Two applicatio gave 86·2% mortality.—Inst. agric. Res., Titogra and Exp. Stat. Cult. Adriatic, Bar.

831. Uzzan, A., Pelle, C., and Mahdi, M.
Détermination de la maturité des olives. Relation entre la composition des fruits et les caractères des huiles. (**Determination of maturity in olives. Relationship between fruit composition and oil characteristics.**)
Oléagineux, 1956, **11**: 705-13, bibl. 1.

Composition of the fruit and data on spectroscop absorption, pH and reducing sugar content of the were recorded from olives in different regions of Tunis during the ripening period. The apparent constan of the oil+water content of the fruit is suggested as basis for determining optimal maturity.—Off. Hu d'Olive de Tunisie, Sfax.

Tung.

(*See also* 662.)

832. Nyasaland.
Bvumbwe Tung and Agricultural Experiment Station.
A.R. Nyasaland Dep. Agric. 1954/55, Part II, 1956, pp. 68-74, bibl. 2 .

Clonal trials: Data for high yielding selections for ne plantations or gapping up are tabulated. *Inte cropping and cover crops:* The best returns have be obtained by intercropping with a cultivated cro *Manuring:* Zn improved tree appearance in one expe ment; in an N trial, all levels gave significant yi increases over the control. *Biennial bearing:* Th was a significant correlation coefficient between total rainfall for the June–August period and crop for the following year. Deblossoming in the "on" year did not influence cropping in the following year.

833. Kilby, W. W., and Potter, G. F.
Research on care of young trees in tung orchards.
Miss. Fm Res., 1956, **19**(3): 8, illus.

Fertilizer trials with a 5–10–5 fertilizer were carried out on trees newly planted in a heavy sandy loam at the Mississippi Experimental Tung Farm. Trees fertilized after growth had started made 48% more shoot growth and 18% more primary branches by the autumn than trees fertilized at time of planting. Placing the fertilizer 9–12 in. away from the tree gave much better results than placing it 6–12 in. away, but it made no difference whether it was applied in circular or parallel bands. Experiments made in 1947 and 1948 showed that hay mulching of replants in a mature tung orchard was an economical way of ensuring satisfactory growth. In 1953 three types of mulch were compared with frequent hoeing for replants. Hay mulch resulted in the best growth and the largest number of primary branches. Tung hull mulch and hoeing gave good and similar results, but mulching with paper fertilizer sacks was less satisfactory as the sacks caused the rain water to flow away from the trees.

834. Lagasse, F. S., and others.
U.S. Field Laboratory for Tung Investigations.
A.R. Fla agric. Exp. Stats, 1955, pp. 124-8.

Nutritional studies: Young tung trees grown with a Bermuda grass cover showed reduced total plant weight in comparison to a no cover treatment; the growth reduction was accompanied by reduced leaf K and increased leaf Ca and Mg. In experiments on N sources and on levels of K and Zn in soil and sand cultures, increasing the ratio of ammonia N to nitrate N increased plant weights; K increased tree top weight; a high Zn level was toxic in sand; and in soil an increased ammonia N to nitrate N ratio increased leaf K, whereas in sand the opposite effect was observed. In a field test added oxygen had no effect on the detrimental effect of grass to young seedlings; cover crops of lupin and lespedeza were also detrimental to growth of young tung. The use of zinc versenate (Zn-EDTA) to correct Zn deficiency did not give satisfactory results. Symptoms of urea toxicity were observed in bearing trees receiving soil applications of the fertilizer. A polarographic method of determining Zn has been applied successfully to the determination of Mn.

835. Merrill, S., Jr., Potter, G. F., and Brown, R. T.
Responses of mature tung trees on Red Bay soil to boron and magnesium.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 160-4, bibl. 4.

In the Tung Belt along the Gulf of Mexico and extending to the Atlantic boron may sometimes be deficient. The addition of Mg and B resulted in increase of these elements in the leaves, but in this respect was unimportant as the amounts present were already enough. Applied Mg failed to decrease the K content of the leaves. B resulted in increased leaf K. The trials which have been in progress for some 20 years indicate that the application of moderate amounts of B, say borax at up to 1·15 lb. per acre might be advantageous. —U.S.D.A., Bogalusa, La.

836. Lagasse, F. S., and others.
The effects of two levels of nitrogen, phosphorus, potassium and calcium in factorial combination on tung oil production.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 165-70.

Results are recorded and discussed of experiments on clonal trees planted in 1942 at LaCrosse, Fla, on Arredondo fine sand with particular reference to leaf composition, yield and oil. In general they confirm previous findings. Nitrogen effected substantial and profitable increases in yield of fruit. Potassium increased the oil content and the well-being of the trees. Phosphorus had little effect, and as regards calcium results indicate that sufficient should be applied to ensure the cultivation of adequate winter or summer cover crops between the trees.—U.S.D.A., Gainesville, Fla, and Bogalusa, La.

837. Raymond, W. D., Thorpe, E. F. J., and Ward, J. B.
***Aleurites fordii* nuts from Swaziland.**
Colon. Plant Anim. Prod., 1955 (issued 1956), **5**: 239-42, bibl. 4.

Data are presented on the nut and oil characteristics of samples representing 5 clones. The oils contained 80·5 to 84·0% elaeostearic acid and had gelation times of less than 15 mins., which are within the requirements of the British Standard for this type of oil.

Noted.

838.

a Aiazzi-Mancini, M.
Le attuali conoscenze in materia di tossicologia degli esteri fosforici e sul loro impiego nella lotta contro la mosca delle olive (*Dacus oleae*, Gmel.). **(The present state of knowledge concerning toxicity of phosphoric esters and their use for controlling the olive fly, *Dacus oleae*.)**
Not. Mal. Piante, 1956, No. 37/38, pp. 51-61.
Up to 3 p.p.m. parathion in olive oil considered harmless.

b Anon.
Joint experiments on the control of citrus fruit decay in storage, 1953. [Japanese.] **Idem 1954.**
[*Publs*] *Tôkai-Kinki agric. Exp. Stat. hort. Div.*, 1954, pp. 28, and 1955, pp. 36.

c Baines, R. C., Foote, F. J., and Martin, J. P.
Fumigate soil before replanting citrus for control of the citrus nematode.
Citrus Leaves, 1956, **36**(10): 6-8, 24, 27, illus.
Fumigate soil before replanting to control citrus nematode.
Calif. Citrogr., 1956, **41**: 427, 448-51, illus.
Reasons, methods and chemicals.

d BENEMERITO, A. N.
Citrus fruit juices.
Philipp. J. Agric., 1954 (issued 1956), **19**: 153-60.
Fruit sizes, weights and juice contents given for 25 varieties, mostly mandarins.

e BOTHAM, J. R.
Fungus diseases of citrus.
J. Dep. Agric. S. Aust., 1956, **59**: 500-6, illus.
Descriptions and control.

f BRICHET, J.
Pour répondre aux besoins de la consommation l'oléiculture doit se moderniser. **(To respond to the demands of consumption olive culture must be modernised.)**
Fruits et Prim., 1956, **26**: 195-204, bibl. 18, illus.
Algerian practices discussed.

g BRINGHURST, R. S.
Breeding tetraploid avocados.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 251-7, bibl. 9.
With the help of colchicine.

h BURKE, J. H.
A look at three foreign citrus varieties.
Citrus Leaves, 1956, **36**(9): 10, 32, illus.
Notes on Shamouti, Ortanique and Ugli.

i CAHOON, G. A., HARDING, R. B., AND MILLER, D. B.
Declining citrus root systems.
Calif. Agric., 1956, **10**(9): 3, 12.
See *H.A.*, 26: 990.

j DEL CAMPO, E.
El estado de los olivares en España. **(The state of olive groves in Spain.)**
Bol. Oleic. int., 1956, No. 32/33, pp. 51-6.
Including notes on soil management, fertilizing and pest control.

k CHALAND, E.
Utilisation des fruits du *Citrus triptera*. **(Utilisation of fruits of *Citrus triptera*.)**
Rev. hort. Paris, 1956, **128**: 1522-3, illus.
The fruits of this frost-resistant species make a good marmalade.

l CHAPOT, H.
Une nouvelle maladie à virus des agrumes dans le Moyen-Orient. **(A new virus disease of citrus in the Middle East.)**
Reprinted from *C.R. Sci. nat. phys. Maroc*, 1956, **22**: 99-105, illus.
Stubborn disease known elsewhere as little-leaf or xeromorphosis.

m COSTANTINO, G.
La lotta contro le coccinIglie degli agrumi mediante emulsioni di olii minerali e di esteri fosforici, da sole o in miscele. **(Control of scale insects on citrus by means of mineral-oil emulsions and phosphoric esters, separately or in mixtures.)**
Not. Mal. Piante, 1956, No. 37/38, pp. 91-123, bibl. 61.
Results from the U.S.A., Algeria and Italy reviewed.

n DICKSON, R. C., FLOCK, R. A., AND LAIRD, E. F., JR.
Spread of tristeza on citrus.
Calif. Agric., 1956, **10**(10): 4.
Citrus aphids and the spread of tristeza, or quick decline.
Citrus Leaves, 1956, **36**(8): 10, 31.
See also *H.A.*, 26: 4127i.

o DI PRIMA, S.
Riconferma della validità del metodo biostatistico nella descrizione e classificazione varietale dell'olivo. **(Confirmation of the validity of the bio-statistical method for the description and classification of olive varieties.)** [English summary 6 lines.]
Ann. Sper. agrar., 1956, **10**: 1143-9, bibl. 1.
Further evidence in defence of the method, which was recently criticized [*H.A.*, 26: 2132].

p EMBLETON, T. W., AND JONES, W. W.
Potash and orange fruit size.
Citrus Leaves, 1956, **36**(8): 8-9.
See *H.A.*, 26: 3056.

q EVREINOFF, V. A.
Contribution à l'étude du dattier. **(Contribution to the study of the date palm.)**
J. Agric. trop. Bot. appl., 1956, **3**: 328-33.
Distribution and origin discussed.

r FORESTI, B.
Alcune osservazioni sulla determinazione e sul significato dei residui di paratione negli olii. **(Some observations on the determination and significance of parathion residues in oils.)**
Not. Mal. Piante, 1956, No. 37/38, pp. 63-9, bibl. 33.
Biological determination of parathion in olive oil more accurate than chemical.

s GALVEZ, N. L., AND OTHERS.
The influence of nitrogenous fertilizers on the pH and exchangeable base status of certain coffee and citrus soils.
Philipp. Agric., 1955, **39**: 81-90, bibl. 23.
No tree responses given.

t GEORGHIOU, G. P.
Control of medfly on citrus.
Educ. Leafl. Dep. Agric. Cyprus **3/56**, 1956, pp. 8, bibl. 1, illus.
Growers' bulletin on control of *Ceratitis* with sprays and baits.

u HODGSON, R. W.
Twenty-five years of citrus introduction at U.C.L.A.
Citrus Leaves, 1956, **36**(6): 13, 20, 32; **36**(7): 13, 29; and **36**(8): 18, 32.
Collection at the University of California.

v HU, C. C.
History of citrus in China. [Chinese, with English summary ½ p.]
J. agric. Ass. China, 1956, **14**: 54-61, bibl. 18.

w KESTERSON, J. W., AND HENDRICKSON, R.
A comparison of two commercial methods for the production of citrus oils in Florida.
Reprinted from *Amer. Perfumer Aromatics*, 1956, February, pp. 4, bibl. 3, illus., as *J. Ser. Fla agric. Exp. Stat.* **448.**
Including tabulated characteristics of cold-pressed grapefruit, tangerine and Persian lime oils.

x MARTIN, J. P., AND OTHERS.
Soil fungi and seedling growth.
Calif. Agric., 1956, **10**(10): 6.
Soil fungi and growth of citrus seedlings.
Citrus Leaves, 1956, **36**(9): 6-7.
See *H.A.*, 26: 3084.

y MOOK, K.
Les dégats dans les plantations d'agrumes du Midi de la France. **(Damage to citrus groves in the Midi of France.)**
Fruits et Prim., 1956, **26**: 92-3.
Frost damage in early 1956.

z PELLEGRINI, G.
La lotta antidacica ad una svolta. **(A turning point in control of the olive fly.)**
Inf. fitopat., 1956, **6**: 262-6, illus.
See *H.A.*, 26: 3114.

839.

a PENNISI, L.
Gli agrumi nell'alimentazione e nell'industria. **(Citrus fruits in nutrition and industry.)**
Riv. Agrumic., 1956, **1**: 225-38.
Data include composition and vitamin content of oranges and lemons.

b PENNISI, L.
Le più indicate varietà di arancio per l'industria dei succhi. **(The varieties of orange most suitable for the juice industry.)**
Riv. Agrumic., 1956, **1**: 321-6.

c PITANZA, M.
Residui tossici dell'olio ricavato da olive trattate con esteri fosforici. **(Toxic residues in oil extracted from olives treated with phosphoric esters.)**
Not. Mal. Piante, 1956, No. 37/38, pp. 229-33, bibl. 21.
Methods of determining residues reviewed.

d PLANTENZIEKTENKUNDIGE DIENST, WAGENINGEN.
De Middellandse Zeevlieg (*Ceratitis capitata* Wied.). **(The Mediterranean fruit fly.)**
Vlugschr. PlZiekt. Dienst Wageningen **75**, 1956, pp. 4, illus.
Measures adopted in Holland to prevent its introduction in citrus fruits.

e RACITI, G.
Dati analitici e industriali relativi a limoni di tipo Femminello comune. **(Analytical and industrial data relating to lemons of the Femminello type.)**
Riv. Agrumic., 1956, **1**: 327-33.
Composition of fruits of Santa Teresa, Sciacca, Femminello and Monachello.

f REBOUR, H.
La protection des vergers contre les vents. **(The protection of orchards against wind.)**
Fruits et Prim., 1956, **26**: 305-6, illus.
Species used in North Africa as windbreaks.

g RODNEY, D. R., AND OTHERS.
Sodium in lemon tree collapse.
Calif. Agric., 1956, **10**(9): 4, 10, 12.
See *H.A.*, 26: 4070.

h RUGGIERI, G.
Intorno alla scelta degli agrumi da coltivare. **(Observations on the choice of citrus varieties for cultivation.)**
Riv. Agrumic., 1956, **1**: 309-19.
In Sicily.

i RUSSO, F.
La presenza del virus della tristeza su limone Dwarf Meyer e mandarino Satsuma riscontrata in Sicilia. **(The presence of tristeza virus in Dwarf Meyer lemon and Satsuma mandarin confirmed in Sicily.)**
Riv. Agrumic., 1956, **1**: 281-9, bibl. 17, illus.

j RUSSO, F., AND RACITI, G.
La carenza di microelementi nutritivi negli agrumi. **(Minor-element deficiency in citrus.)**
Not. Mal. Piante, 1956, No. 37/38, pp. 207-16.
See *H.A.*, 26: 1004, 2084 and 2086.

k SITES, J. W., AND CAMP, A. F.
Producing Florida citrus for frozen concentrate.
Reprinted from *Food Technol.*, 1955, **9**: 361-5, bibl. 20.
Cultural factors affecting quality reviewed.

l SOURDAT, M., AND HASDENTEUFEL, J.-E.
La tristeza des citrus (quick decline). Etude réalisée au Brésil. **(Tristeza or quick decline of citrus. A study carried out in Brazil.)**
Fruits d'Outre Mer, 1956, **11**: 329-40, bibl. 13, illus.
A review.

m TAYLOR, O. C., AND CAHOON, G. A.
Citrus rejuvenation study seeks healthy root growth.
Citrus Leaves, 1956, **36**(10): 9, 33, illus.
See *H.A.*, 26: 988.

n TODD, G. W.
The effect of gaseous ozone, hexene, and their reaction products upon the respiration of lemon fruit.
Physiol. Plant., 1956, **9**: 421-8, bibl. 18.
See *H.A.*, 26: 1008.

o WALLACE, J. M.
The search for new citrus varieties.
Citrus Leaves, 1956, **36**(8): 12, 33.
Procedure for indexing introductions in the U.S.A.

p ZINNA, G.
La lotta biologica contro le cocciniglie degli agrumi e dell'olivo. **(Biological control of scale insects of citrus and olives.)**
Not. Mal. Piante, 1956, No. 37/38, pp. 225-8.
Predators and parasites used in Italy and in California.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 54, 950u, 952a, 954, 957, 981, 984, 996, 1003h, i.)

840. Commonwealth Economic Committee.
Plantation crops.
[*Publ.*] *Commonw. Econ. Cttee*, 1956, pp. 200, H.M. Stationery Office, Lond., 5s.

The usual notes and statistics are given on sugar, tea, coffee, cocoa, spices, rubber and tobacco. Appendixes 1–4 contain information on: International agreements regarding sugar, tea and rubber; government measures in certain countries regarding plantation crops; export duties and cesses on plantation products; and duties on plantation products imported into certain countries.

841. (Allen, E. F.)
Notes on current investigations (agronomy) October to December, 1955.
Malay. agric. J., 1956, **39**: 69-72.

Cacao: Yield analyses from a trial on NPK manuring of young trees showed a linear response to P; promising growth of young trees has been obtained under both tall and dwarf coconuts. *Pineapples:* In a ridging and spacing trials the best yields have been obtained from close-spacings on the flat; dry soil dressings have so far given better results than foliar nutrient sprays. *Coffee:* Manurial experiments with Liberian coffee have shown that K encourages the production of well-shaped bushes with healthy leaves, whereas N may be harmful as it appears to suppress branching. *Tea:* In the second year of a manurial trial there was a yield response to 80 lb. per acre of N (as sulphate of ammonia) and 30 lb. per acre of P_2O_5 (as Christmas Island rock phosphate); K_2O had no measurable effect on yield.

842. Zanzibar.
Annual Report of the Zanzibar Department of Agriculture, 1955, 1956, pp. 31, shs. 2/–.

Cloves. Some degree of die-back control has been obtained by pruning and protection of exposed tissues. Artificial drying in a pyrethrum-type drier and sun drying on trays sliding on racks for weather protection both showed promise. *Coconut.* DDT and resin in diesel oil and kerosene reduced damage by *Pseudotheraptus wayi* and increased nut yields. *Pineapples.* Further trials with NAA to advance fruiting [see *H.A.*, 26: 1169] have shown that good size fruits can be produced if the plants treated are well grown but not if they are poorly grown.

843. Cain, J. C.
Absorption and metabolism of urea by leaves of coffee, cacao and banana.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 279-86, bibl. 5.

Urea used as a foliage spray in Central America is of potential value and the present experiments contribute to its eventual use as such. In trials using a semi-micro technique complete absorption was obtained in coffee and cacao in less than 24 hours and in bananas in 30 hours. On absorption urea rapidly disappears by marked proteolysis and translocation of N compounds from the leaf. In coffee and banana amino acids generally increase with asparagine predominating. It is assumed that these metabolic products might be a useful source of N to the plant.

844. Thornton, N. C., and others.
Pesticides in tropical agriculture.
Advances Chem. Ser. **13**, 1955, pp. 102, bibls., illus.

This publication contains 13 review articles originally presented at a symposium held by the American Chemical Society in New York in Sept., 1954. Among them are the following reviews: "Pesticides in sugar cane", by E. M. Summers (pp. 14-17); "Chemical control of pests and diseases of cacao", by R. G. Orellana (pp. 21-30, bibl. 52); "Control of rubber diseases by chemicals", by F. L. Wellman (pp. 31-42, bibl. 48); "Coffee diseases, insects, and weeds controlled by chemicals", by F. L. Wellman (pp. 43-63, bibl. 103); "Pesticides in banana culture", by N. C. Thornton (pp. 71-5); "Pest control in citrus production in tropical and subtropical America", by A. F. Camp (pp. 80-4); and "Weed control in Puerto Rico", by T. J. Muzik (pp. 85-95, bibl. 60, mainly in sugar cane).

845. Miller, C. D., and others.
Vitamin values of foods used in Hawaii.
Tech. Bull. Hawaii agric. Exp. Stat. **30**, 1956, pp. 94, bibl. 45.

This bulletin supersedes *Tech. Bull.* 6, published in 1947. The data presented are largely based on new assays and include figures for moisture, carotene, thiamine, riboflavin, niacin and ascorbic acid for a wide range of fresh and processed foods, including fruits and vegetables. In addition, the results are reported of a number of special studies on ascorbic acid in fruits, including the effect of variety on its content in avocadoes, bananas, guavas and limes; changes in its content during the ripening of mangoes, papaws and poha [Cape gooseberry or *Physalis peruviana*]; its distribution and stability in guavas; variations in its content both between and within varieties of mango; and its stability and variations in papaw fruits and its content in papaw seeds.

846. Willet, J. R.
Leucaenaklonen en hun behandeling in de proeftuin Kaliwining. (***Leucaena* clones and their treatment in the Kaliwining Experiment Station.**) [English and Indonesian summaries 15 and 17 lines.]
Bergcultures, 1956, **25**: 289-93.

By budding rootstocks of *Leucaena glauca* with strong clones of other *Leucaena* species and hybrids it is hoped to obtain homogeneous shade for plantations in a fairly short time. The nursery treatment of the budded trees is described. Regular pruning renders the trees less liable to attack by mealybug. Spacing of about 6 m. square for these trees has proved satisfactory in coffee plantations.

847. Dutta, S. K., and Basu, S.
Preservation of bamboo frames and baskets.
Two and a Bud, 1956, **3**(2): 3-4.

The results are reported of trials with preservatives for bamboo frames and basket pots used in nurseries.

The best method for preserving frames was to boil them in a 10% copper sulphate solution. Baskets were best preserved by immersion for 1 min. in a 50 : 1 Cuprinol-Gammexane L. G. 140 mixture.

Bananas.

(*See also* 2, 843, 844, 950d, 951q, u, v, 1003d.)

848. Simmonds, N. W., and Shepherd, K.
The taxonomy and origins of the cultivated bananas.
J. Linn. Soc. (*Bot.*), 1955, **55**: 302-12, bibl. 15.

A taxonomic scoring method is used to classify the edible bananas and to provide evidence on their evolution. Edible diploid forms of *Musa acuminata* are thought to be the primary source of the whole group to which another species, *M. balbisiana*, has contributed by hybridization. There is a faint possibility that a third wild species has contributed to the origins of a small group of triploid hybrid types. Triploidy was probably established under human selection for vigour and fruit size; tetraploidy is inexplicably rare. The two Linnaean species *M. paradisiaca* and *M. sapientum* refer to identifiable edible varieties which are both shown here to be of hybrid origin. [From authors' summary.]—Imp. Coll. trop. Agric., Trinidad.

849. Fergus, I. F.
A note on arsenic toxicity in some Queensland soils.
Qd J. agric. Sci., 1955, **12**: 95-100, bibl. 6.

Investigations into the cause of the abnormal growth in bananas [chlorotic stripes on leaves and failure to set or develop fruit properly] on certain soils established the presence of appreciable quantities of arsenic. The affection was shown to be associated with rock outcrops on soils derived from quartzite. Analytical results for arsenic in soils and plants are given, and tomatoes and beans are suggested as suitable indicator crops for arsenic toxicity. [Author's summary.]—Div. Plant Ind., Qd Dep. Agric. Stk.

850. Berrill, F. W.
Banana fruit filling.
Qd agric. J., 1956, **82**: 311-14, illus.

Poor filling of banana fruits can be prevented if the plants have an efficient root system and a large healthy crown of leaves. Irrigation may be necessary in dry weather and surplus suckers should be removed. Hessian bunch covers improve the filling of the fingers and reduce the taper of the bunches. J.R.L.

851. Deullin, R., and Monnet, J.
Observations sur la dureté de la pulpe de la banane pendant le développement sur le plant et en phase préclimactérique en vue de caractériser la qualité du fruit. **(Studies on the firmness of banana pulp during development on the plant and in the preclimacteric phase made with the object of estimating fruit quality.)**
Fruits d'Outre Mer, 1956, **11**: 341-54, bibl. 13, illus.

Measurements of the firmness of banana pulp, using a penetrometer, have shown that there is a relationship between resistance and stage of maturity. There appeared to be some relationship between the curve of firmness of the pulp during development on the plant and fruit quality. During the climacteric phase the resistance of the pulp rapidly decreased.—I.F.A.C.

852. Andrade, A. C., Puzzi, D., and Torres, S. C. A.
Experiências para o contrôle das podridões do engaço e pedicelo da banana. **(Experiments on control of decay of banana stems and pedicels.)**
Biológico, 1956, **22**: 75-84, illus.

Bunch-stem rot (*Thielaviopsis paradoxa*) and fruit-stalk rot (*Gloeosporium musarum*) were almost completely controlled by spraying whole bunches immediately after harvest with Shirlan WS [salicylanilide] at 0·6% (using an adhesive) and storing at 20°–26° C. Good control was also achieved by spraying only the stem or by painting the solution over the cut surface. A mixture of 2% Dowcide A and 1% hexamine was harmful to the fruit and treatment of the stem with potassium permanganate and vaseline was ineffective. In another series of experiments, with bananas exported in refrigerated holds from Brazil to London after treatment with 0·6% or 1·2% Shirlan WS, the degree of control was markedly less than in fruit stored at 20°–26° C.

853. Wang, H., and Chen, K. H.
The occurrence of banana mealybug in south Taiwan and its control tests. [Chinese, with English summary 1 p.]
J. agric. Ass. China, 1956, **14**: 42-8.

Summer oil emulsion, Folidol and malathion all effectively control this mealybug (*Pseudococcus* sp.), but only the last is satisfactory on bananas. A 0·25% spray of 50% malathion gave 94·58% control. Four applications at monthly intervals are recommended. A 0·2% spray of 50% malathion emulsion with 0·5% of 20% aldrin may also be used. J.R.L.

854. Hord, H. H. V., and Flippin, R. S.
Studies of banana weevils in Honduras.
J. econ. Ent., 1956, **49**: 296-300, bibl. 5.

Chlordane, diluted to 3 : 2,000 and applied to the bases of banana stools at a rate of 200 gal./ha., greatly reduced populations of *Cosmopolites sordidus*. No harmful effect was apparent on the banana plants. Rhizome traps were more effective than those cut from the pseudostems. Fresh surfaces cut on the rhizome traps every 2 days appreciably increased the catch. The weevils preferred Gros Michel rhizomes to those of the Bout Round variety.

855. Tsalpatouros, A.
La banane chez le mûrisseur. III. IV. **(The banana in the ripening chambers. III and IV.)**
Fruits d'Outre Mer, 1956, **11**: 305-19, bibl. 3, illus., and 355-9, bibl. 5.

The use and effects of heat on the ripening of bananas are discussed in Part III. Notes are also provided on apparatus used to control environment in ripening rooms. In Part IV the author discusses the "barrier" between warm and cool temperatures in banana storage, and the reactions of bananas to storage. [For parts I and II see *H.A.*, 26: 3127.]

Cacao.

(*See also* 841, 843, 844, 950i, 951y.)

856. MUELLER, W.
Seltsame Frucht Kakao. Geschichte des Kakaos und der Schokolade. **(Strange fruit cacao. The history of cacao and chocolate.)**
Gordian, 1954/55, Vol. **54**, Nos. 1303, 1304, 1306; 1955/56, Vol. **55**, Nos. 1307-28, 1330; 1956/57, Vol. **56**, Nos. 1331-43 inclusive, instalments about 2 pp. each.

This series of articles, an illustrated edition of which will appear in book form, deals largely with the history of cacao production.

857. HOBLYN, T. N.
Some difficulties in field experimentation with cocoa on the Gold Coast.
World Crops, 1956, **8**: 355-60, bibl. 2, illus.

The present methods of clearing and rehabilitating land before planting cacao preclude the use of elaborate experiments. The many sources of error in field trials include irregular natural shade, the damage shade trees do when lopped or felled, and the uneven influence of diseases and pests. Only the simplest types of layout, with generous replication, should therefore be adopted.

858. HANNA, A. D., JUDENKO, E., AND HEATHERINGTON, W.
The control of *Crematogaster* ants as a means of controlling the mealybugs transmitting the swollen-shoot virus disease of cacao in the Gold Coast.
Bull. ent. Res., 1956, **47**: 219-26, bibl. 2, illus.

The mealybug populations on isolated cacao trees was reduced to 1·2% by 2 sprays of DDT applied a fortnight apart after nests of ants had been removed. Control was unsatisfactory when ant nests were not removed. The efficiency of soil applications of dimefox against mealybugs was not increased when ants had previously been partially eliminated. Large-scale mealybug control by controlling the attendant ants is, however, considered impracticable.

859. VAN DINTHER, J. B. M.
De cacaotor *Steirastoma breve* Sulz. en zijn bestrijding. **(The cacao beetle, *Steirastoma breve*, and its control.)** [English summary 1 p.]
Surinaam. Landb., 1956, **4**: 155-62, bibl. 4, illus.

Tests have shown that damage by the cacao beetle may be reduced by spraying with insecticides during the dry season. DDT and chlordane gave better results than lead arsenate. Although spraying is more expensive than the normally-recommended method (cutting out the larvae from the trunk) less damage to tree growth results.

860. FERNANDO, H. E., AND MANICKAVASAGAR, P.
Economic damage and control of the cacao capsid, *Helopeltis* sp. (fam. Capsidae, ord. Hemiptera) in Ceylon.
Trop. Agriculturist, 1956, **112**: 25-36, bibl. 14, illus.

The *Helopeltis* sp. responsible for serious damage to cacao in the main cacao-growing regions of Ceylon is distinct from *H. antonii.* It attacks pods and youn shoots and may cause the death of plants. Sprays o DDT and dieldrin are effective, but they are troublesome to apply and need to be repeated at monthl intervals. Dusts of 5% DDT, 0·65% and 1·3% gamma-BHC, 1% diedldrin and 1·5% endrin gav complete or nearly complete control when applied wit a light power-driven duster at 10 lb. per acre, an afforded protection for the ensuing 2–2½ months Aldrin 2½% dust was ineffective.

Coconuts.

(*See also* 366, 669a, 950c, f, j, q, t, 951e, h, t.)

861. COCONUT RESEARCH INSTITUTE, CEYLON.
Annual Report of the Coconut Research Board of the Coconut Research Institute for 1954, 1956, pp. 57.

Certain aspects of this report have already been referre to briefly in the report of the Director of Agriculture o Ceylon [*H.A.*, 26: 1257]. Investigations here reporte in more detail include: *Botany:* In a replanting trial i its 5th year the girth of young palms is smallest i plots where all the old palms have been left standin and largest where all the old palms were remove before replanting. A promising hybrid has bee obtained from a dwarf green ♀ × tall Ceylon ♂ cross but the reciprocal cross has proved less satisfactory Fumigation of nursery soil with EDB, ECB and DI failed to stimulate seedling growth and at highe dosages adversely affected seed-nut germination an development. Seed nuts were stored for up to 18 week without loss of viability both in heaps in the open unde shade and in a room. Several insecticides (based o DD, BHC, dieldrin and chlordane) caused 100% mortality of rhinoceros beetle larvae within 2 to 5 days Two deer repellants failed to act as cattle repellant when applied to coconut leaves. *Soil Chemistry* Further progress is reported in long-term NPK an fertilizer placement trials. Studies on the analysis o coconut water as a guide to the K status of the soi have shown that the K content of nut water of differen palms receiving the same K applications may var considerably, but that 100 nuts may provide a representative sample. *Technological Chemistry:* Considerabl work is reported on vinegar production. Analyse have been made of coconut poonac and the oil content of hybrid palms. *Animal Husbandry:* Among introduced cover crops that show promise are *Stylosanthe bojeri* and *Bracharia brizantha.*

862. ESCRITOR, M. L.
Some physical and chemical properties of the soils in a coconut plantation in Gumaca, Quezon.
Philipp. Agric., 1954, **38**: 334-54, bibl. 15 [received 1956].

A high-yielding area in an old, unfertilized coconu plantation consisted of a sandy clay loam, with a cla loam subsoil, whereas a poor-yielding area consiste of a coarse sandy loam with a subsoil of sandy cla loam. The total N, available P, exchangeable Ca an K, and organic matter contents were higher in the goo than in the poor soil. The Mg content was highe in the poor soil; pH values were similar. Coconu water from high-yielding trees had a higher K conten than that from low-yielding trees. The K content of coconut water increased with a corresponding increase in the amount of available K in the soil.

863. SANKARASUBRAMONEY, H., PANDALAI, K. M., AND MENON, K. P. V.
Studies on soil conditions in relation to the 'root' and 'leaf' diseases of the coconut palm in Travancore-Cochin. Part II. Total phosphoric acid, 'available' phosphoric acid and iron content of coconut soils.
Indian Coconut J., 1955, **9**: 20-9, bibl. 9.

In studies of soils from healthy and diseased areas no significant differences were found in the P_2O_5 status of the soil. Healthy soils had a higher content of total Fe than did soil from diseased areas, which were not, however, deficient. P fixation did not appear to be a factor correlated with disease incidence.—Centr. Coconut Res. Stat., Kayangulam. [For part I see *H.A.*, 25: 3271.]

864. VELASCO, J. R., AND FERTIG, S. N.
Progress report: sand culture experiment with coconut.
Philipp. Agric., 1956, **39**: 540-7, bibl. 3, illus.

Young coconut seedlings were grown in culture solutions with varying levels of nutrients. Symptoms characteristic of cadang-cadang disease were artificially produced by detaching the young plants from their nuts. Potassium deficiency may play a part in the occurrence of these symptoms.

865. GANGOLLY, S. R., AND NAMBIAR, M. C.
Occurrence of barren nuts in coconut palms.
Bull. Indian centr. Coconut Cttee, 1956, **9**: 255-7, illus.

Five types of barren nut are described. They occur most commonly on trees producing 40–60 nuts per year, and may be identified from the fourth month of development. Heavy manurial treatments, restriction of tree production and artificial pollination did not affect the percentage of barren nuts.—Centr. Coconut Res. Stat., Kasaragod.

866. CUMBER, R. A.
Experiments to test the possible control of the rhinoceros beetle (*Oryctes rhinoceros* L.) with insecticides.
The testing of possible attractant chemicals in Western Samoa.
Tech. Inf. Circ. S. Pacific Commiss., **16**, 1956, pp. 1-8, bibl. 5, and pp. 9-15, bibl. 1.

Experiments with insecticides: Thirteen organic insecticides were each applied in 3 forms (dust, liquid and wettable powder) to the terminal fronds of palms at the sites where beetle damage first occurs. In each case the applications were repeated at intervals of 1, 3 and 6 months. The results suggest that, although some of the treatments may have reduced damage to some extent, none was effective in keeping the crowns free from attack. *Experiments with attractants:* Some 60 chemicals were tested as attractants in insectary trials and in field traps. None, however, showed promise.

867. NIRULA, K. K.
Investigations on the pests of coconut palm. Part II. *Oryctes rhinoceros* L.
Indian Coconut J., 1955, **8**: 161-80, and 1955, **9**: 30-79, bibl. 71, illus.

Following a detailed review of the literature and an account of the life history of the beetle, the results are given of experiments with chemicals applied to breeding sites. Among these BHC was particularly successful and showed a residual effect lasting for 6 months. At the recommended dosages BHC did not affect the roots or growth of coconut palms or intercrops. Sprays gave better results than dusts. Intensive beetle control in one plot reduced the incidence of new attacks from 40% to 5%. Traps of breeding material plus 0·1% BHC were also used successfully. A mixture of sand and 10% BHC applied in leaf axils protected palms from beetle attack in dry weather. Mason mixture (a proprietary coal tar product) was an effective repellent in dry weather.—Centr. Coconut Res. Stat., Kayangulam. [For the introductory part I see *H.A.*, 26: 2202.]

868. HOWARD, H. D.
Report on a tour of the copra producing areas of the Far East and Western Pacific.
International Association of Seed Crushers, 1 Watergate, London, E.C.4, 1956, pp. 50 (cyclostyled), plus 23 pp. photographs and 8 pp. plans.

Mr. Howard's tour, which was undertaken in January–April 1956, had the following objectives: (*a*) To study copra production methods and the reasons for the great variation in the quality of copra exported to Europe; (*b*) to study steps being taken in different territories to improve quality; (*c*) to discuss the possibility of further improvement and ways and means of achieving it; and (*d*) to discuss the effects of poor quality copra on the production of edible oils, processing problems and developments in British seed crushing mills. The tour covered Ceylon, Singapore, Malaya, Indonesia, the Philippines, Papua and New Guinea, the Solomon Islands, Fiji, Tonga and Western Samoa. The various methods of harvesting, husking, cracking and drying are critically compared, and problems associated with the moisture content of copra and with dust, sulphur and smoke contamination are discussed. Suggestions are made for improvements and also for further investigational work. The accounts of the visits to individual territories include information on research institutes and such special problems as the rhinoceros beetle. The various types of drier in use are described and detailed sketch plans are provided of four of them, namely the Standard Ceylon Copra Kiln, the De Vapor Dryers (both single and multiple), the Kukum Hot-air Drier and the New Zealand Reparation Estates Copra Drier.

869. COOKE, F. C.
Copra production by the smallholder. I and II.
World Crops, 1956, **8**: 435-8, illus., and 489-91, 493, illus.

The construction and operation of a simple and inexpensive kiln for the small-scale manufacture of good copra is described, with a list of materials used, costs and labour charges. Details are given of preparation and processing.

870. VERGHESE, E. J., THOMAS, P. K., AND RAMANANDAN, P. L.
Quantity and quality of ball copra in relation to the age, size and shape of nuts.
Indian Coconut J., 1955, **9**: 11-19, illus.

Preliminary studies have shown that small-sized nuts were the most suitable for ball copra manufacture, nuts 11 to 13 months old being used. A note on the preparation, grading and marketing of ball copra is also included.—Centr. Coconut Res. Stat., Kasaragod.

Coffee.

(*See also* 365, 838s, 841, 843, 844, 950k, p, y, 951d, f, x.)

871. Trojer, H.
La investigación agroclimatológica para el cultivo del café en Colombia. (**Agroclimatological investigations in relation to coffee growing in Colombia.**) [English summary 2¼ pp.]
Bol. inf. Café, Chinchiná-Caldas, 1956, **7**: 78-101, bibl. 11.

A tentative interpretation is made of the relationships between weather factors and growth, flowering, fruit formation, maturation, bud formation and yield of coffee in Chinchiná.

872. Pattabhiraman, T. V.
A new method of extraction of coffee plants from bed nursery and planting them out into the field.
Indian Coffee, 1956, **20**: 166-9, illus.

An illustrated account is given with labour costs of a new tool for transplanting coffee and tea. The plants are dug out with an iron cylinder in which they are transported to their permanent positions.

873. Dupont, L.
Méthode pratique pour transplanter les jeunes arbres et les arbustes. (**A practical method for transplanting young trees and shrubs.**)
Fruits et Prim., 1956, **26**: 290-1, illus.

A method used for transplanting coffee in south Indo-China is described. A hollow cylinder with metal handles is sunk round the young plants, which are lifted with a cylinder of soil round their roots. Each soil cylinder is wrapped in tinfoil. The dimensions of the apparatus are given.

874. Busch, J.
Étude de la nutrition minérale du caféier robusta dans le Centre-Oubangui. (**Study of the mineral nutrition of robusta coffee in the Centre-Oubangui.**) [English and Spanish summaries ¾ p. each.]
Agron. trop., 1956, **11**: 416-47.

Foliar N was related to monthly rainfall, except in the short dry season (June–July) when it remained high, and was almost unaffected by the application of N to the soil. Foliar P varied similarly to N but responded to P applications except in the December–January dry season. Foliar K was low during October–mid-March, which covered the period of berry development to that of flower bud initiation. Application of K was most beneficial when leaf K was high (mid-March–September). The K cycle was approximately the inverse of those for Ca and Mg. Leaf Ca was not affected, but leaf Mg was reduced by K application. The best results should be obtained by applying N and K, half in March and half in August–September, and all the P at the earlier date.

875. Machado S., A.
Los fertilizantes para el cafeto y el diagnóstico foliar. (**Fertilizers for the coffee plant and foliar diagnosis.**)
Bol. inf. Café, Chinchiná-Caldas, 1956, **7**: 123-36, bibl. 9.

In field experiments covering 6 years the initial fertilizer treatments (*a*) potassium sulphate+bone meal (K+P), and (*b*) bone meal (P) were modified respectively to K and P+K when the need was indicated by foliar and soil analysis, both being changed during the final phase to K only. Unfertilized controls were used throughout. Both *typica* and *bourbon* coffee responded equally well to K and not to P, with *bourbon* as the higher yielding variety in all treatments. Growth was retarded at foliar K levels below 1%. Foliar N, Ca and Mg were correlated with growth rate but not with yield, and foliar P was correlated with neither. Low production was consistently associated with low foliar K and relatively high Ca/K ratios, but high foliar K, especially with moderate or low N, resulted in Mg deficiency. Good production was attained at foliar levels of 1·8% K, 0·7–1·3% Ca, 0·35% Mg, 2·5% N and 0·11–0·15% P.

876. Beaumont, J. H., Lange, A. H., and Fukunaga, E. T.
Initial growth and yield response of coffee trees to a new system of pruning.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 270-8, bibl. 2.

A new "dehorning" system of pruning coffee was described and compared with the system in current use in Hawaii. Total vertical and lateral growth and average yield of trees pruned to the two systems were essentially the same. Lateral branch growth in the first 2 years of trees trained to the dehorning system was greater in number and total length, which contributed to the high yields of the 3-year-old verticals. Heavy yields in the third year of the trees trained to the dehorning system caused a discernible drain on the tree, which resulted in defoliation, less lateral growth during production of the crop, and a smaller crop the following year. Success of the system depends in large measure on a high yield of the 4-year-old tree to ensure a high 4-year average, and also on possible savings in labour of pruning, fertilization and harvesting. [Authors' summary.]—Univ. Hawaii, Honolulu.

877. Grangier, A., Jr., and Wellman, F. L.
Algunos fungicidas usados con adherentes en aspersiones para cafetos jóvenes. (**Some fungicides used with stickers in sprays for young coffee plants.**) [English summary 23 lines.]
Turrialba, 1955, **5**: 123-31, bibl. 13.

In attempts to control *Cercospora coffeicola* and *Colletotrichum coffeanum* in coffee nurseries only 3 out of 21 sticker substances proved suitable for use with fungicides under humid tropical conditions. Fermate, the most satisfactory fungicide, was improved in action by PEPS (56% polyethylene polysulphide). Captan was improved by RDA-156-B10 (a C-oil product containing 0·8% of Antarox A401 with an addition of 10% by volume of Triton B-1956). The same sticker minus the Triton was less effective. Both PEPS and RDA significantly raised the low effectiveness of

Crag 658 and the former slightly improved the moderate action of Perenox. Combination of urea with the spray treatments for correction of existing N deficiency very markedly increased fungus control and almost completely masked the effects of stickers.

878. ECHANDI, E.
Inhibition of gemmae (cabecitas) production of *Mycena citricolor* on coffee trees.
Plant Dis. Reptr, 1956, **40**: 775.

In laboratory tests the production of gemmae (infection bodies) by *Mycena citricolor* was inhibited by mercuric, but not by other, fungicides. At inhibitory concentrations the mercuric fungicides were not phytotoxic to coffee trees.—Univ. Costa Rica, San José.

879. REYES V., M.
Resultados preliminares de un estudio comparativo de fungicidas en el control del "ojo de gallo" (*Omphalia flavida* Rangel) en almácigos de cafeto. **(Preliminary results of a comparative study on fungicides for the control of leaf spot in coffee nurseries.)**
Bol. trim. Exp. agropec. P.C.E.A., Lima, 1955, **4**(3): 15-17.

Applications of 0·75 and 1% bordeaux mixture, Dithane Z-78 [zineb] at 1 and 1·5 lb./100 gal., and Cupra-vit at 2 and 3 lb./100 gal. were compared for control of leaf spot (*Omphalia flavida*) in coffee nurseries. The sprays were applied at 10-day intervals from the beginning of the rainy season. In all the sprayed plots the decrease in infection was highly significant compared with the unsprayed controls. Bordeaux mixture and zineb gave significantly better control than Copra-vit. There was no difference between the effect of the different concentrations, and no effect on plant growth was observed 2 months after the last application. Taking cost and ease of application into consideration, the use of zineb at 1 lb./100 gal. is recommended.—Agric. exp. Stat., Tingo María.

880. SCHMITZ, G.
Les fourmis du caféier robusta. **(Ants of robusta coffee.)**
Bull. Inf. I.N.É.A.C., 1956, **5**: 263-70, bibl. 2, illus.

Species of *Oecophylla*, *Macromischoides* and *Atopomyrmex* and their damaging effects on coffee bushes are described. Control is effected by nest destruction with insecticides. Neither pyrethrum powder nor sodium arsenite baits give more than slight control. Treatments recommended are dusting with 2% methyl parathion or injecting 0·1% emulsion of ethyl parathion. *Atopomyrmex* nests can be destroyed by injecting a mixture of 2 parts of 40–50% active chlordane or 50% DDT and 5 parts of sugar in 100 parts of water.

881. GOMES, J.
Os "piolhos brancos" do cafeeiro e outras plantas. **(Mealybugs of coffee and other plants.)**
Correio da Manhã reprinted in *Bol. Super. Serv. Café, S. Paulo*, 1955, **30**(341): 43.

Damage done by *Pseudococcus* spp. and the associated red ants is described. No satisfactory measures have been evolved for the control of mealybugs on the roots of coffee, but good results have been obtained by spraying infested foliage with 1% aqueous emulsions of Albolineum or Citro-Mulsion, repeated if necessary after 20–25 days. The ants tend to disappear when mealybugs are eliminated, but are more effectively controlled by dusting the soil surrounding the plants with 1%-active BHC.

882. ANON.
Se estudian los medios de combate contra la palomilla del cafeto. **(Control measures against the coffee mealybug are being studied.)**
Not. agríc. Serv. Shell. Agric. Venezuela, 1956, No. 11, 1-3, illus.

Effective control was achieved with 19·5% endrin, 24% aldrin or 74% chlordane, using 1 l. of insecticide in 200 l. of water and spraying 5 l. of the liquid on the soil round each coffee bush. The treatment was effective for at least a year, controlling also the ants responsible for the spread of mealybugs. Diazinone gave good control but was much less persistent.

Mangoes.

(*See also* 952d.)

883. YOUNG, T. W.
Mango fruitfulness.
A.R. Fla agric. Exp. Stats, 1955, pp. 315-16.

Pollen collected from freshly-opened flowers was stored at varying temperatures before germination on an agar medium. Viability was not affected by storage for up to 60 hours at 40° to 50° F., but germination was reduced after storage at 32° F. for 10 hours. Little germination of fresh pollen occurred at incubation temperatures of 40° to 61° F., but there was about 6% germination after further incubation at 77° F. Germination of fresh pollen averaged about 13% in these studies. Length of pollen tube was only slightly reduced when fresh flowers were stored or pollen incubated at low temperatures. [See also *H.A.*, 26: 3144.]

884. SPENCER, J. L., AND KENNARD, W. C.
Limited stigmatic receptivity may contribute to low fruit set in the mango (*Mangifera indica* L.).
Proc. Amer. Soc. hort. Sci., 1956, **67**: 287-9, bibl. 9.

Flowers of the varieties Amini, Mullgoa, Paheri and Totafari were emasculated and pollinated 3, 6, 12 and 24 hours after they had opened. When pollination was done 3 hours after anthesis 68·4% of the pollen grains produced tubes which penetrated the stigma surfaces, but when it was done 6 hours after anthesis the percentage dropped to 9·9 and in later pollinations there was no penetration. This short period of stigma receptivity combined with protogyny (maturation of stigmas before anthers) may contribute to the low yields produced by mangoes in many regions.—U.S.D.A., Mayaguez, P.R. [See also *H.A.*, 26: 1154.]

885. KENNARD, W. C., AND WINTERS, H. F.
The effect of 2,4,5-trichlorophenoxypropionic acid applications on the size, maturation and quality of Amini mangos (*Mangifera indica* L.).
Proc. Amer. Soc. hort. Sci., 1956, **67**: 290-7, bibl. 13.

Sprays of 2,4,5-TP, ranging in concentration from 50 to 800 p.p.m., were applied to the fruits and foliage of Amini mango at three different times during the fruit development period. In general, the higher the concentration and the earlier the time of application, the greater the effect of 2,4,5-TP on mango fruit development and quality. Sprays applied 3 weeks after blossoming hastened maturation by as much as 2 weeks but were associated directly with reduced fruit size. Applications 6 weeks after blossoming hastened fruit maturation by one week but also caused reduced fruit size. Applications of the material at both stages of fruit development were associated with increased fruit drop. When applied 4 weeks before the usual time of fruit harvest, 2,4,5-TP neither hastened maturity nor affected fruit size. Sprays of the hormone did not increase the amount or intensity of red color development, regardless of the concentration or time of application. This growth regulator was found to decrease the total soluble solids content and to increase the percentage moisture and the amount of ascorbic acid in the pulp of mature fruit. Injury to foliage was not apparent during the year of application, and blossoming of the treated limbs was normal the following spring. Sprays of 2,4,5-TP were found to reduce significantly the germination of seeds from treated fruits and to lengthen the time required for seedling emergence. Such seedlings were smaller in size than those of seeds from control fruits. [Authors' summary.]—U.S.D.A., Mayaguez, P.R.

886. MATHUR, P. B., AND SUBRAMANYAM, H.
Effect of a fungicidal wax coating on the storage behaviour of mangoes.
J. Sci. Food Agric., 1956, **7**: 673-6, bibl. 11.

Badami (Alphonso) mangoes were dipped in 1·7–2·7% aqueous emulsions of a fungicidal wax containing 5% of *o*-phenylphenol and after drying in a current of hot air the fruit was stored at 79–86° F. and R.H. 55–87%. The treatment was found to lessen the physiological losses in weight, increase the retentions of vitamin C and moisture, delay ripening, decrease the percentage wastage and increase the storage life of the fruit. [Authors' abstract.]—Centr. Food tech. Res. Inst., Mysore.

Oil palms.

(*See also* 950b, n.)

887. TOOVEY, F. W., AND PURVIS, C.
Segregation from the *dura* × *pisifera* cross.
J. W. Afr. Inst. Oil Palm Res., 1956, No. 4, pp. 106-9, bibl. 1.

The theory of fruit form inheritance postulated by Vanderweyen [*H.A.*, 23: 3561] has been confirmed, crosses between *dura* and *pisifera* palms showing the expected segregation into 100% *tenera*. Similar segregation occurred when imported Deli was used instead of *dura* in crosses with *pisifera*.

888. DUPRIEZ, G.
Prépépinières d'Elais. **(Pre-nurseries for oil palms.)**
Bull. Inf. I.N.É.A.C., 1956, **5**: 141-53, bibl. 2, illus.

Humus soil enriched with forest litter or compost and treated with insecticide is recommended in preference to washed sand as a pre-nursery substrate. Th advantages of sowing seeds in basket-pots are discussed Details are given of the preparation and use of see beds and of planting in pots of compressed peat and i two different types of basket. Growth of seedling under these systems, with and without shading, i compared. Experimental results are quoted to sho the adverse effects of shading on oil palm seedlings i the Belgian Congo. There was no response to minera fertilizers when rich soil was used.

889. SAVELLANO, N. S.
Four methods of germinating African oil palm seeds.
Philipp. Agric., 1956, **39**: 535-9, bibl. 1, illus.

Removal of the pericarp but leaving the shell intact and soaking seeds without pericarp in 1% HCl gav better results than leaving the pericarp intact or tha removing the pericarp and breaking the shell. Differences between 3 media, sand, soil and compost, wer negligible.

890. PURVIS, C.
The root system of the oil palm: its distribution, morphology, and anatomy.
J. W. Afr. Inst. Oil Palm Res., 1956, No. 4, pp. 60-82, bibl. 16, illus.

A detailed study is reported, with the aid of illustrations on the root systems of oil palms of different ages The root system is typically monocotyledonous an mainly superficial, especially as regards the feedin roots. Anatomically the roots possess characteristic typical of those of water plants. The main concentrations of feeding roots occur close to the bole of th tree and about 5 or 6 ft. away, just beyond the limi of regular ring-cutlassing. Whether or not thes positions will prove to be best for applying fertilizer remains to be determined.

891. BROESHART, H.
The application of foliar analysis to oil palm cultivation. III. Foliar analysis and mineral deficiencies.
Trop. Agriculture, Trin., 1956, **33**: 315-20, bibl. 13.

Monthly foliar analysis of oil palms, growing unde controlled nutritional conditions in a sand cultur experiment during a 16-month period, led to the following conclusions: (1) Diagnosis of deficiencies should no be based on the concentration of one single elemen in the leaf tissue. In this respect, the use of critica values for diagnostic purposes constitutes a wrong interpretation, as it implies that the level of one singl element only is considered in the interpretation of th data. (2) The expression of the data as ratios betwee two or more elements does not provide any more essential information than the critical values for diagnosti purposes and may even lead to a wrong diagnosis (3) It is concluded that a satisfactory basis for th diagnosis of deficiencies from foliar analysis data i afforded by the recognition of the characteristi deviations from the normal leaf composition of th contents of all the elements in the leaf tissue. [Author's summary.] Res. Dep., Huilever S.A., Yaligimba Belgian Congo. [For parts I and II see *H.A.*, 26 3152 and 4182.]

892. PREVOT, P., AND OLLAGNIER, M.
Utilisation du diagnostic foliaire. **(Utilization of foliar diagnosis.)**
Oléagineux, 1956, **11**: 695-703, bibl. 17.

Examples are given of the value of foliar analysis in detecting and correcting K and Mg deficiencies in oil palms and brief reference is made to K deficiency in coconut palms. In one instance a 7-fold increase in yield of oil palms resulted from annual applications of potassium chloride at 1·5 kg. per tree over a 5-year period. Critical values are given for foliar N, P, K, Ca and Mg in both palms.

893. HEWITT, E. J., AND BULL, R. A.
A preliminary survey of deficiency symptoms in crop plants in the oil palm belt of Nigeria.
J. W. Afr. Inst. Oil Palm Res., 1956, No. 4, pp. 83-105, bibl. 38, illus.

Acute K deficiency is widespread in oil palms in Nigeria, but further investigation is needed to determine the full range of symptoms. Magnesium deficiency is another serious problem in oil palms, but has a wider host range, also affecting citrus, rubber, coconuts, coffee and cashews. The condition known as "plant failure" occurs throughout Nigeria, and it is thought that acute multiple deficiencies are involved. Micronutrient disorders observed or suspected in other plants include Zn and Cu deficiencies and possibly Mo deficiency mainly in citrus.

894. ROBERTSON, J. S.
Leaf diseases of oil palm seedlings.
J. W. Afr. Inst. Oil Palm Res., 1956, No. 4, pp. 110-22, bibl. 5, illus.

Three types of anthracnose have been recognized and are described. The causal organisms have been identified as *Botryodiplodia palmarum*, a *Melanconium* sp., probably *M. elaeidis*, and *Glomerella cingulata*. In a nursery spraying trial with 6 copper fungicides, Perenox and burgundy mixture reduced the number of infected plants, and all the treatments reduced the number of leaf infections. In a second trial started at the pre-nursery stage a considerable degree of control was obtained, thiram and ziram creams being the most effective of 9 fungicides used. Reducing seedling density in the raised trays also reduced disease development. Freckle (caused by *Cercospora elaeidis*) was significantly reduced by 6 copper fungicides, the weaker of two Perenox sprays (0·05% Cu) being the least phytotoxic.

Papaws.

(*See also* 950f.)

895. HAMILTON, R. A.
A preliminary report on effects of soil application of Crag Fungicide 974 on growth of papaya plants.
Proc. Amer. Soc. hort. Sci., 1956, **67**: 298-301, bibl. 8, illus.

When 200 lb./acre of Crag 974 (dimethyl tetrahydrothiadiazine thione), which destroys nematodes as well as fungi, were worked into the soil 5 months before papaws were planted, the plants made significantly more growth in the ensuing 7 months than did comparable plants in untreated plots.—Univ. Hawaii, Honolulu.

896. CHARAVANAPAVAN, C.
Studies on the improved methods of production, storage and standardization of papain.
Trop. Agriculturist, 1956, **112**: 45-52, bibl. 10, illus.

Studies are reported which provide information on the drying and storage of papain, its moisture, ash and nitrogen contents, and methods of detecting adulterants and of estimating its proteolytic activity. A diagram is provided of a papain drier which effects rapid drying at 55° C.

Pineapples.

(*See also* 797, 841, 842, 950a, e.)

897. GOWING, D. P.
An hypothesis of the role of naphthaleneacetic acid in flower induction in the pineapple.
Amer. J. Bot., 1956, **43**: 411-18, bibl. 13.

Evidence is presented in support of a working hypothesis of the role of SNA (naphthaleneacetic acid, sodium salt) in the induction of flowering in the pineapple. The hypothesis is that SNA acts by competitively lowering the effective native auxin level in the stem tip, that the time of appearance of the inflorescence can be controlled by the amount and frequency of SNA applications (i.e., by the length of time the effective native auxin level is kept low), that the number of flowers produced is conditioned by the rate of SNA application, and that earliness of flowering is directly related to the effectiveness of flower induction. Further, evidence is presented to indicate that IAA (indoleacetic acid) is the auxin of importance in pineapple flowering. [Author's summary.]—Pineapple Res. Inst. Hawaii, Honolulu.

898. SU, N. R., AND HUANG, C. R.
Effect of foliar fertilization after the initiation of floral differentiation of pineapples. [Chinese, with English summary 1 p.]
J. agric. Ass. China, 1956, **14**: 30-7, bibl. 7.

A field experiment was carried out to determine the effect of foliar applications of urea, monosodium phosphate and potassium chloride solutions after the initiation of floral differentiation of pineapples on the nutritional status of the plants. Applications of urea and also of K resulted in a significant increase of leaf nitrate, but P application decreased it. Total leaf N was unaffected by the treatments. Soluble P increased more if N, P or K were applied independently than when two elements were applied together. Although high leaf P and early flower bud formation were related, there were no significant differences in date of bud formation between treatments. There were also no significant differences among the fertilizer treatments in the date of fruit ripening, although the concentration of soluble P in the leaves was higher in the earlier maturing fruits. No significant differences were found in the yield, but the mean yield of each fertilizer treatment was higher than the control.—Tou-Liu Exp. Stat., Taiwan Pineapple Corp. J.R.L.

Rubber trees.

(*See also* 366, 844, 950h, m.)

899. Schultes, R. E.
The Amazon Indian and evolution in *Hevea* and related genera.
J. Arnold Arbor., 1956, **37**: 123-52, bibl. 41, illus.

The seeds of several species of *Hevea*, *Micrandra* and *Vaupesia* are used by Amazonian Indians as food, but the evidence presented here does not lend support to the claim that man has influenced the general course of evolution in the genus *Hevea*. Notes are applied on the distribution and main characteristics of a number of species, amongst which are 11 *Hevea* species and varieties.

900. Rubber Research Institute, Ceylon.
Report of the Work of the Rubber Research Board in 1955, 1956, pp. 135.

Work reported includes: *Chemistry:* approximate determination of the d.r.c. of fresh and ammoniated latex, pre-coagulation, inorganic constituents of Ceylon latex. *Botany:* Breeding and selection, field experiments on crown budding, clone and seedling trials, hedge-planting. *Mycology:* Study and control of *Oidium heveae*, *Gloeosporium albo-rubrum* and *Phytophthora palmivora*. *Agronomy:* Manuring and weed control.

901. Muzik, T. J., and Cruzado, H. J.
Formation and rooting of adventitious shoots in *Hevea brasiliensis*.
Amer. J. Bot., 1956, **43**: 503-8, bibl. 17, illus.

Grafting appeared to stimulate the formation of adventitious shoots in 18-month-old seedling *Hevea brasiliensis* trees, although it inhibited the sprouting of the cotyledonary-nodal buds. Shoots of adventitious and cotyledonary-nodal origin were superior in rooting ability to axillary shoots, suggesting a strong position effect in the seedling rather than a juvenility factor, although this was not true in the mature plant. Shoots from a mature clonal tree of *Hevea brasiliensis* were successfully rooted for the first time. These shoots were probably adventitious in nature. Roots and hypocotyls did not produce buds or shoots. [Authors' summary.]—Fed. Exp. Stat., Mayagüez, P.R.

902. Beaufils, E. R.
Les équilibres minéraux dans le feuillage et dans le latex de l'*Hévéa brasiliensis*. **(Mineral equilibrium in the foliage and latex of *Hevea brasiliensis*.)** [English, German and Russian summaries ¼ p. each.]
Ann. agron., 1956, **7**: 205-18, bibl. 16.

Analyses of leaves and latex have shown that with normal nutrition the relationship of major nutrients for leaves is $N \simeq a\,K \simeq a^2P$ and for latex $2N \simeq aK \simeq a^2P$, with a ranging from 3·4 to 4·3. Unbalanced nutrition and deficiencies can be detected, without the necessity for control trees, from aberrant values of a. Normal, slightly and markedly unbalanced ratios of K/P, N/K and N/P are tabulated for both leaves and latex. These are confirmed by a detailed study of analysis figures from the rubber growing areas of the world.

903. Constable, D. H.
Foliar zinc and *Oidium heveae* in Ceylon.
Nature, 1956, **178**: 926-7, bibl. 3.

The analysis of leaves from 3 hevea clones, differing widely in susceptibility to *Oidium heveae*, does no support the hypothesis that *Oidium* resistance is related to foliar zinc context. [*H.A.*, 26: 3159.]—Rubber Res Inst. Ceylon.

904. Hutchison, F. W., and others.
Coal tar fungicides for the control of mouldy rot.
J. Rubb. Res. Inst. Malaya, 1956, **14**: 449-91, bibls.

This number of the journal is divided into 3 part covering work in Malaya and at Long Ashton I. Testing of coal tar fungicides for the control o mouldy rot (*Ceratostomella fimbriata*), by F. W Hutchison, pp. 451-8, bibl. 5, in which methods used in field tests are described. II. The fungicidal properties of coal tar distillates, (i) and (ii), by G. V. Coles R. J. W. Byrde and J. T. Martin, pp. 459-71, bibl. 9 and pp. 472-81, bibl. 4 [see *H.A.*, 25: 1068 and 26: 1189] III. The analysis of coal tar fungicides, by G. V. Coles pp. 482-91, bibl. 6, reprinted from *J. Sci. Food Agric.* 1956, **7**: 11.

905. Fassi, B., and Maertens, C.
L'annélation, l'empoisonnement et l'essouchement des vieux hévéas avant la replantation. **(Ringing, poisoning and uprooting of old rubber trees before replanting.)**
Bull. Inf. I.N.É.A.C., 1956, **5**: 193-201.

Neither felling nor ringing were effective in killing the trees or depleting the roots of starch. Poisoning the stumps with sodium arsenite was effective in both respects usually within 1 year. Removal of bark and poisoning of trunks did not kill the roots within 1 year but greatly reduced their starch content, an importan feature in controlling *Fomes lignosus*. The economic of the various methods are compared.

Sugar cane.

(*See also* 2, 45, 66w, 367-370, 844, 950g, r, v, x, z 951a, i, j, m, r, w, z, 952b, 965, 974, 1003d, g.)

906. British West Indies Sugar Association.
British West Indies Sugar Association Handbook for 1954, pp. 102, illus.

Since the last handbook was issued two years ago B.W.I.S.A. has been enlarged to include the St. Vincen Sugar Association. The useful information provided in the previous edition [*H.A.*, 24: 3198] on suga industry organizations, sugar cane breeding, suga technology, field research in progress or planned, and statistics of production, etc., has been expanded and brought up to date, and in addition progress report are provided for each of the territories on the presen status of pests and diseases.

907. Barbados.
21st Annual Report British West Indies Central Sugar Cane Breeding Station, Barbados, for the year ending September 30th, 1954, pp. 53.

As in the past the greater part of the report is devoted to the results of trials with selected seedlings. Among the newer canes B.4744 has given outstanding results in several trials and other seedlings of promise include B.45151, B.46364, B.4738 and B.47419. The seedlings of the B.49' series proved generally disappointing, with the possible exception of B.49119, which was outstanding as a plant cane but has not yet completed ratoon trials. The report also includes details of seedlings and fuzz despatched to, and notes on variety trends and performances in, the other contributing colonies, as well as a summary of cytogenetical research.

908. Capo, B. G.
What's new on sugarcane research at the Agricultural Experiment Station.
Sugar J., 1956, **18**(12): 68-73, illus.

A brief report is given of the latest developments at the Agricultural Experiment Station, Rio Piedras, Puerto Rico. The variety P.R.980 shows promise for local conditions and is highly resistant to mosaic. The use of B.34104, which is very susceptible to mosaic, should be discontinued. Endrin and BHC have shown promise for controlling moth-borer. Planting schedules to spread harvesting over a longer period are described. In leaf analysis tests it has been shown that climatic variation may have a significant effect on leaf-nutrient values.

909. Staub, S., and Limfat, E.
Design of hot air oven for the treatment of sugar cane cuttings.
Sugar J., 1956, **19**(1): 16-18, illus.

The design is described of a simple, hot-air plant, in which the heat is provided by paraffin blow lamps. Trials have resulted in various modifications, and in the latest type developed the mortality of setts during treatment has amounted to only about 20%, a figure which compares favourably with results obtained elsewhere.—Dep. Agric., Mauritius.

910. Yates, R. A.
The germination of cane cuttings, with special reference to damage caused by hot water treatment.
Trop. Agriculture, Trin., 1956, **33**: 306-14, bibl. 6.

Investigations have shown that the germination capacity of cane setts, whether subjected to hot water treatment or not, is largely associated with certain easily recognized external characteristics. Materials for planting should be chosen from a stand containing canes of uniformly large diameter, and the canes should be taken when young before the basal eyes have become hard and mature; mature eyes that are beginning to swell, i.e. with their outer scales bud splitting, germinate badly.—Bookers' Sugar Est., Georgetown, B.G.

911. Malaguti, G., and Viso Rodríguez, A.
La pudrición de los esquejes de la caña de azúcar y posibilidad de su control con fungicidas. **(Decay of sugar cane setts and the possibility of its control by fungicides.)**
Agron. trop. Maracay, 1954, **4**: 61-7, from abstr. in *Turrialba*, 1955, **5**(*Supl. bibl.*): 25.

The disease is caused by the fungus *Thielaviopsis* (*Ceratostomella*) *paradoxa*. Germination was improved, but not significantly, by immersing the setts for 5 min. in an aqueous 0·25% solution of Granosan M, and in 1% solutions of Semesan Bell, Copper Compound A, Phygon XL, and Arasan S. F.

912. Douglas, J. W. E. H. S.
The application of hydroponics to the sugar industry.
Int. Sugar J., May 1956, reprinted in *S. Afr. Sugar J.*, 1956, **40**: 451-3, bibl. 3, illus.

Experimental plots of sugar cane were grown in soilless culture with a nutrient solution supplied every 10 days. The final yield was equivalent to 140 tons of cane per acre and 14 tons of sugar. Standing the setts for up to 24 hours before planting in a 20% solution of tribasic potassium phosphate assisted sprouting.—West Bengal exp. Fm, Darjeeling.

913. Moir, W. W. G.
Crop logging. What do we know about it?
Sugar J., 1956, **19**(3): 20-1.

Results from a large coordinated experiment on time of planting, nutrition and time of harvesting sugar cane show certain trends. Stalk analysis proved more reliable and showed wider and longer-lasting differences due to treatment than did sheath-blade methods. There were also indications of marked effects of N on K and P contents and of time-of-year effects on the weights of plants being analysed. The same level of analysis on different plantations may result in wide variations in yield per acre.

914. Bonnet, J. A., Riera, A. R., and Roldán, J.
Correlation at different ages between nitrogen, green- and dry-matter contents of leaves, and yield of sugarcane grown in sand culture. [Spanish summary ½ p.]
J. Agric. Univ. P.R., 1956, **40**: 101-9, bibl. 11, illus.

The variety M.336 was grown in sand cultures under glass; 7 increments of N, replicated 4 times, were studied with other nutrients and water at optimum levels. There were significant responses to N in yields of cane, sugar, trash and roots. Correlation analyses indicated that the % N content and the green and dry weights of the 3rd to 6th leaves of sugar cane can be used to predict yield, provided that plant age is also taken into account.

915. Wang, S.-C., and others.
Field experiments on the effects of aqua ammonia, nitrogen solution No. 4, ammoniated spent wash concentrate, spent wash concentrate upon sugar cane. [Chinese, with English summary 3 pp.]
Rep. Taiwan Sugar Exp. Stat., 1955, No. 13, pp. 1-12, bibl. 15.

Fertilizer experiments were carried out over 3 seasons (1952–55) on different alluvial soil types. On sandstone and sandstone-clay-slate soils the yield of cane was increased by 70–111% and 10–31%, respectively, by the application of N, but there was less response on a slate soil. The different types of N produced similar responses. K applications on the sandstone and sandstone-clay-slate soils increased cane yields by 13–24% and 5–19% respectively, but no significant increase was obtained on the slate soils. The effects of KCl and K_2SO_4 were similar. On all soils spent wash [dunder] concentrate gave better results than KCl. Descriptions are given of the methods of concentrating dunder and of adding ammonia to increase its N level and form the ammoniated spent wash. J.R.L.

916. Wang, S.-C., and Li, K.-Y.
An investigation on adequate depth of applying aqua ammonia in different types of soils. [Chinese, with English summary 1 p.]
Rep. Taiwan Sugar Exp. Stat., 1955, No. 13, pp. 33-43, bibl. 6.

In replicated experiments carried out on sand, loam and clayey-loam soils the same yield of cane was obtained when aqua ammonia was used in place of solid N fertilizers. In the sandy soil applications of aqua ammonia 20 cm. deep gave better yields of cane than shallow applications (10 or 15 cm.). The depth of application had no effect on yield on the loam and clayey-loam soils, but on the latter it proved difficult to cover the application holes. J.R.L.

917. Wang, S.-C., and Yeh, C.-S.
A brief report on the tests of anhydrous ammonia as a nitrogenous fertilizer in sugarcane field. [Chinese, with English summary 8 lines.]
Rep. Taiwan Sugar Exp. Stat., 1955, No. 13, pp. 63-4.

Applications of anhydrous ammonia and solid N fertilizers (ammonium sulphate and calcium cyanamide) to sugar cane, on loamy slate and loamy sandstone-clay soils, did not produce any significant differences in cane or sugar yields. J.R.L.

918. Tabayoyong, F. T., and Ferraris, I. P.
VMC Expt. No. 240('55). Nitrogen foliar fertilization of POJ 3016 (plant crop).
Sugar News, 1956, **32**: 393-7, 409.

Foliar applications of N in varying amounts were compared with much larger amounts of N applied to the soil. Foliar application of 4 kg./ha. of N when the cane was 5 months old gave the most economical and profitable cane and sugar yields.

919. Locsin, C. L., Tabayoyong, F. T., and Ferraris, I. P.
VMC Expt. No. 248('55). Potash foliar fertilization of H37-1933.
Sugar News, 1956, **32**: 296-300, bibl. 4.

Foliar applications of potash, totalling 60 kg. K_2O per ha., were applied in 3 equal doses when the canes were 3, 4 and 5 months old. The resultant cane and sugar yields were similar to those obtained with soil applications of 200 kg. K_2O.

920. Wang, S.-C., and others.
Report of field experiments on liming red earth, devoted to sugarcane cultivation in Taiwan. [Chinese, with English summary 2 pp.]
Rep. Taiwan Sugar Exp. Stat., 1955, No. 13, pp. 65-80, bibl. 31.

In two experimental plots, both on strongly leached red earth, soils applications of lime increased the yields of green manure crops and of the succeeding plant cane crops. Where P was also applied a further increase in yield was obtained, but applications of P without lime gave no increase. Neither fertilizer affected c.c.s. significantly. J.R.L.

921. Ashton, F. M.
Effects of a series of cycles of alternating low and high soil water contents on the rate of apparent photosynthesis in sugar cane.
Plant Physiol., 1956, **31**: 266-74, bibl. 23, illus.

Two similar potted sugar cane plants were placed in a photosynthetic chamber, where one went through a series of 5 cycles of alternating low and high soil water contents, while the other was maintained at a high soil water content. In the first plant there was a progressive increase in the daily cumulative rate of photosynthesis as the cycles of alternating low and high soil water contents progressed from the first to the fifth cycle. This increase occurred on the day of irrigation and to a lesser extent on the first and second days after irrigation. By the third day after irrigation the increase was no longer clearly apparent. With the successive low and high water cycles there was also a progressive decrease in the interval of time before the sugar cane plant showed the first increase in the rate of photosynthesis after irrigation. An overnight recovery in the rate of photosynthesis occurred even when the soil water content was at the permanent wilting percentage. An increase in the rate of photosynthesis also occurred in this plant when the soil water declined to near the permanent wilting percentage during brief periods of reduced light intensity, but this did not happen when the water supply was adequate.—Hawaiian Sugar Planters' Ass., Honolulu, and Ohio State Univ., Columbia. [See also *H.A.*, 26: 1199.]

922. Buzacott, J. H.
The low sugar content of cane. Results of investigations in North Queensland.
Proc. Qd Soc. Sugarcane Tech., reprinted in *S. Afr. Sugar J.*, 1956, **40**: 703-7, bibl. 2.

The author briefly reviews the factors which affect the sugar content of plants and concludes that several of these probably contributed to the lower sugar contents which occurred in Queensland cane in 1955. They include insufficient light during the growing season, extensive arrowing, and lack of cold and dry periods in winter and spring.

923. Chacravarti, A. S., Srivastava, D. P., and Khanna, K. L.
Soil application of 2,4-D to increase sugar in cane.
Curr. Sci., 1956, **25**: 302-3, bibl. 3.

Soil treatment with a dilute solution of the amine salt of 2,4-D, applied twice at 3 lb. active material per acre at the times of intercultivation in March and at earthing up in June, produced a large increase (2·57–3·05%) in the sugar content of the cane without appreciably affecting its yield.—Centr. Sugarcane Res. Stat., Pusa. J.R.L.

924. Skinner, J. C.
The effect of maleic hydrazide on the sucrose content of sugar cane.
Tech. Commun. Qd Bur. Sugar Exp. Stats. **1**, 1956, pp. 11, bibl. 19, illus.

When 0·5, 1·0, 2·0 and 4·0% aqueous solutions of the sodium salt of MH were sprayed in March on to 7-month-old plant canes the sucrose content was increased 7 weeks later by 4 units of c.c.s., which was equivalent to an increase of over 80%. The 4·0% concentration was the most effective, but it also caused marked reductions in stalk internode lengths and cane yields. Flowering was inhibited. Similar concentrations applied to older plants in May had no effect on sucrose and little effect on yield of cane. Partial defoliation of plants by lopping in March (a standard method of delaying arrowing) caused a reduction in brix of about 5 units, which indicates that major reductions in c.c.s. may be expected to follow defoliation by natural agencies such as hail, wind, pests and diseases.

925. Rao, M. S. S., Prasad, R. S., and Khanna, K. L.
Response of sugarcane to sulphanilamide.
Curr. Sci., 1956, **25**: 265, bibl. 7.

In preliminary pot experiments sulphanilamide produced a general improvement in growth, yield and juice quality in sugar cane. The effects on root growth and juice quality were most marked. The greatest yield was obtained when 1·0 g. per pot (containing 18 lb. of soil) was used, but juice quality was highest when 2·0 g. and 2·5 g. were applied.—Centr. Sugarcane Res. Stat., Pusa, Bihar. J.R.L.

926. Zabala, S.
El mosaico de la caña de azúcar. **(Sugar cane mosaic.)**
Idia, 1956, No. 99, pp. 13-20, bibl. 13, illus.

The virus was inactivated at 55°–60° C. The cane varieties grown in Argentina are tentatively divided into four groups: immune, resistant symptomless carriers, slightly susceptible and highly susceptible.—Estac. exp. Villa Alberdi, Tucumán.

927. Charpentier, L. J.
Systemic insecticide studies for control of vectors and sugarcane mosaic in Louisiana.
J. econ. Ent., 1956, **49**: 413-14, bibl. 1.

Field control of rusty plum aphid (*Hysteroneura setariae*) on sugarcane was obtained with Systox, Metacide and schradan. In spite of the high measure of vector control there was no reduction in mosaic incidence. Systox was recovered by chemical analysis from the molasses, syrup and sugar samples processed from treated cane.—Agric. Res. Serv., U.S.D.A.

928. Jepson, W. F.
The biology and control of the sugar-cane chafer beetles in Tanganyika.
Bull. ent. Res., 1956, **47**: 377-97, bibl. 6, illus.

The biology of *Cochliotis melolonthoides* and allied beetles is described. Cultural control methods suggested include delaying planting until July–October, the introduction of quick-maturing varieties grown for 3 ratoons instead of 8 to 10 as at present, regulation of the water table by irrigation control, and the trial of resistant varieties. Biological control is discussed and parasitic species for possible introduction are reviewed. Chemical control experiments have indicated that the application at planting of ½ lb. per 50 ft. of furrow of a BHC powder containing 2·5% of γ-BHC will protect plant and first ratoon crops.

929. (Quaid, G., sr., Muir, R., and Pearce, E. T. S.)
Mechanical harvesting progress. I. Review of investigations in western zones.
II. Louisiana practice now routine procedure.
III. Costs and effects on overall industry efficiency.
IV. Observations in Puerto Rico, Florida and Hawaii.
S. Afr. Sugar J., 1956, **40**: 441-3, 539-43, 613-19, 717-19, illus.

These 4 articles are condensed from a report by an Australian Committee which investigated the latest development in mechanical harvesting in Louisiana, Florida, Puerto Rico and Hawaii. In all cases the impetus adopting mechanical harvesting has been shortage of manpower. Louisiana is probably the most highly mechanized area and its methods are described in most detail. Some of the machines seen are described.

930. Knust, H. G.
Mechanical harvesting of cane in the Bundaberg district.
Cane Grs' quart. Bull., 1956, **20**: 13-14, bibl. 1, illus.

Desirable features from 4 cane-harvesting machines were combined in a new machine fitted with circular cutting discs and antennae-like cane-gathering and bundling devices. The machine worked satisfactorily when used on the lee side of a field but on the windward side the cane tended to scatter.

931. Anon.
Fresh sugarcane's worth more.
Agric. Res. Wash., 1956, **5**(3): 5, illus.

During 2 years' experiments on plant and ratoon canes of C.P.44–101 and several new varieties it was found that the average loss resulting from keeping cane in heaped rows after cutting amounted to 15% of the recoverable sugar after 5 days and to almost 22% after 8½ days. This is caused by losses in weight, decreases in sucrose content, and a decline in purity due to inversion.—U.S.D.A., south. Utiliz. Res. Br., New Orleans. J.R.L.

Tea.

(*See also* 371, 950l, o, s, w, 951b, p, 952c, e, 966, 971.)

932. Tea Research Institute of East Africa.
Annual Report of the Tea Research Institute of East Africa, 1955, 1956, pp. 32.

Agricultural Department: Manuring: In re-designed experiments there was a marked residual effect of N on yields; phosphate and potash were not effective in increasing yields. With a tea type which was slow to reach maximum yields mulching has proved beneficial; there was a high response to S only in the fourth year of this experiment, but the addition of phosphate increased the effect of the mulch more than 3½ times, and there was an indication of an interaction between N and P. *Vegetative propagation:* A high level of watering resulted in the best root growth of cuttings. *Chemical Department:* The chemistry of tea fermentation, and leaf nitrogen and amino-acid contents have been studied.

933. NYASALAND.
Annual Report of the Tea Research Stations, 1954/1955.
A.R. Nyasaland Dep. Agric. 1954/55, Part II, 1956, pp. 30-40.

Field experiments reported include: *Establishment of tea stumps:* In an NPK experiment on young tea, N has increased pruning weights. In planting experiments treatments proving beneficial included nursery fertilization, using 4 in. stumps of at least ½ in. in diameter, shading the stumps with collar pots, and fertilizing at or shortly after planting. *Pruning:* The 3-yearly clean prune treatment has significantly outyielded all other treatments; there are indications that local jat tea may be given a longer pruning cycle. *Tipping:* Increasing the height of tipping Indian jat did not result in loss of crop in the second year; local jat tea yields were not affected by tipping height. *Plucking:* In the fifth year of the experiment no significant differences in crop occurred between 6-, 10- and 14-day plucking rounds. *Fertilizing:* Various fertilizer and time of application experiments are reported. *Spacing:* Two trials combining 3 and 4 levels of sulphate of ammonia with 3 and 4 spacings show that in the first 3 seasons close spacing produces more crop and more prunings per acre, but that in the 4th season wider spacings tend to be more productive. *Shading:* Yields were increased by shading and also by N, to which the response was greater in shade.

934. TAKAHASHI, T., AND OTHERS.
Studies on tea cuttings. [Japanese, with English summary 1 p.]
Bull. Tea Div. Tôkai-Kinki agric. Exp. Stat., 1955, No. 3, pp. 1-27, bibl. 12.

Wilted tea shoots recovered if the water loss was less than 30% of their total weight. In the laboratory cuttings were sprayed daily to prevent drying out. Cuttings with their bases wrapped in sphagnum were successfully stored for 2–3 days. Good results were obtained by spacing cuttings so that their leaves just overlapped. Rooting was promoted by NAA and by Rootone No. 10. Manuring of the cuttings after rooting was necessary, slow acting fertilizers giving the best results. Liming after rooting did not affect shoot growth. Foliar sprays of urea were mainly effective in promoting root development when applied before the cuttings were taken. Shoot growth was stimulated by the application of 3–6 sprays of urea at 1% starting 30 days after the cuttings had been taken.

935. TAKAHASHI, T., AND MORITA, N.
Studies on a sloping tea garden—soil survey and soil conservation. [Japanese, with English summary 1½ p.]
Bull. Tea Div. Tôkai-Kinki agric. Exp. Stat., 1956, No. 4, pp. 60-111, bibl. 27.

Five tea soils occurring in Shizuoka have been classified according to their stability against erosion and their mineral and organic matter contents. Measures found to reduce soil erosion include contour planting, sowing grass or mulching, and the proper lay-out of roads and drains.

936. BARUA, D. N.
Calcium oxalate crystals as an index of nutrient uptake in the tea plant.
Curr. Sci., 1956, **25**: 249-50, bibl. 2.

Earlier work suggested that a standard calcium oxalate crystal count, called the phloem index, was indicative of the K/P balance in the tea plant [*H.A.*, 25: 1113]. In further investigations petiole injections of urea and potassium sulphate and soil applications of ammonium sulphate caused significant reductions in the phloem index as compared with injections of distilled water and calcium chloride. It is concluded that calcium oxalate crystal frequency appears to be a sensitive quantitative index of metabolic changes associated with nutrient uptake and could be used to investigate the relation of the tea plant to its environment.—Tocklai exp. Stat., Assam. J.R.L.

937. AONO, H., AND TAKAHASHI, T.
Studies on foliar nutrient sprays for the tea garden. [Japanese, with English summary 1 p.]
Bull. Tea Div. Tokai-Kinki agric. Exp. Stat., 1956, No. 4, pp. 1-38, bibl. 36.

Growth of tea plants was not improved by foliar sprays of urea, but total-N, soluble-N, caffeine-N, and caffeine-free soluble-N contents of the leaves were increased by sprays of a 0·5% urea solution. Chlorophyll and carotenoid contents also tended to increase. The lower surface of the tea leaf absorbed more than did the upper surface. A foliar spray of N, P, K and Mn increased the leaf contents of N, P and K. Leaf injury occurred more frequently when sticking agents were used with the urea sprays; Gramine was the least toxic agent used. The application of sugar before urea reduced injury. A frost-injured tea garden showed no differences in recovery when manured by foliar sprays or by soil applications. Urea had little beneficial effect on the growth and quality of tea in a garden receiving no other N, although total-N and soluble-N contents were increased.

938. MUHINA, V. A.
Ecological-physiological characteristics of photosynthesis, growth and dry matter accumulation in tea. [Russian.]
Trud. Inst. Fiziol. Rast. Timiryazeva, 1955, 1955, **10**: 177-88, bibl. 8.

In the experiments described the effects of shading and changes in relative humidity were studied on China teas. During the first year of growth the plants were found to tolerate considerably reduced light conditions (up to 75% shade) without reduction of photosynthesis and growth, but in the second and third years the light demand grew. The plants also showed a strong positive reaction to high humidity in their first year, but during the second year the demand decreased and a relative humidity of 98–99% reduced growth and the formation of dry matter, although photosynthetic activity remained high.

939. KAWAI, S., ISHIGAKI, K., AND TAKAYANAGI, H.
Radioactive contamination of the tea plant. [Japanese, with English summary 1¼ pp.]
Bull. Tea Div. Tôkai-Kinki agric. Exp. Stat., 1956, No. 4, pp. 39-59, bibl. 12.

Radioactivity in tea plants and soils, which resulted from hydrogen bomb explosions at Bikini atoll in 1954, was measured and the results are summarized.

940. Park, P. O., Webster, B. N., and Jennings, E. A.
Developments in blister blight control. II. Spraying trials in 1955, using 50% copper fungicides.
Tea Quart., 1956, **27**: 7–9, bibl. 1.

Results showed that there was no significant difference in degree of control of blister blight given by 50% copper oxide and 50% copper oxychloride, when both were applied at 6 oz. per 12 gal. water per acre. The experimental fungicide, Wet Blitox, applied at a rate equivalent to 3 oz./acre of a 50% copper fungicide, gave control almost as effective as that of the 2 standard products despite the reduction in copper content. A 50% organic copper fungicide, CAA, did not give satisfactory control.

941. Park, P. O., Webster, B. N., and Jennings, E. A.
Developments in blister blight control. III. Dusting trials in 1955, using 4% copper blended dusts.
Tea Quart., 1956, **27**: 10-13, bibl. 2.

In one field trial Blidust 4%, Cuprosana and Blidust diluted to 3% gave equivalent control of blister blight. Results with 3 new 4% coated dusts showed that their performance was satisfactory. In a second field trial applications of a coated dust at 6- and 8-day intervals were almost equally effective. At both 6- and 8-day intervals a copper oxychloride spray and a coated dust were almost equally satisfactory.

942. Park, P. O., and Webster, B. N.
Developments in blister blight control. IV. Small scale assay of fungicides.
Tea Quart., 1956, **27**: 14-19, bibl. 3, illus.

A small-scale screening method for testing fungicides against blister blight was developed. All compounds containing copper were effective, but non-copper fungicides were not.

943. Baptist, B. A.
The tea leaf-eating tortrix caterpillar (*Homona coffearia*) Nietn.) as a limiting factor in insecticidal applications on tea.
Tea Quart., 1956, **27**: 28-35, bibl. 14.

Tortrix caterpillars are normally effectively controlled by an introduced parasite, *Macrocentrus homonae*, but it is possible that sprays used to control other pests may upset this balance. Ten trials are here described, in nine of which dieldrin was applied against the shot-hole borer, *Xyleborus fornicatus*, with special reference to the subsequent appearance of the tortrix caterpillar. The results suggest that sprays used to control the borer are unlikely to initiate caterpillar outbreaks, except in new clearings, where the simultaneous application of DDT against caterpillars may be advisable.

944. Minamikawa, J., and Saitô, T.
Influence of sprays and dusts of insecticides on the tea plant and on tea quality. Part 2. [Japanese, with English summary 1 p.]
Bull. Tea Div. Tôkai-Kinki agric. Exp. Stat., 1955, No. 3, pp. 54-80, bibl. 3.

Eleven insecticides were studied. Pyrethrum and a pyrethrum-rotenone mixture had no adverse effects on tea when applied 10 and 20 days before plucking. Allethrin should not be applied within 20 days of plucking. Concentrations of more than 1 in 60 lime sulphur imparted a bad smell to the tea. Sprays of 0·04% DDT did not taint the tea except when applied less than 10 days before plucking; by spraying 30 days before plucking the residue of DDT in the tea was kept below 1 p.p.m. A 0·04% emulsion or suspension of methoxychlor did not taint tea when sprayed 10 days before plucking. BHC and lindane both affected tea quality adversely. DN emulsions at rates between 0·0075% and 0·0134% injured developing buds. Malathion sprayed 30 days before plucking and aramite sprayed 28 and 19 days before plucking had no ill-effects. [For part 1 see *H.A.*, 26: 4245.]

945. Copet, A., Jammar, M., and Peremans, L.
Recherches de normes chimiques en vue de classification des thés du Congo belge. **(Studies of chemical norms for classifying teas of the Belgian Congo.)** [Flemish summary 10 lines.]
Bull. agric. Congo belge, 1956, **47**: 545-51, bibl. 1.

Standards are laid down for contents of moisture, total ash, insoluble ash, ratio of soluble to total ash, aqueous extract and cellulose.—Lab. Office Prod. agric. Bukavu.

946. Roberts, E. A. H., Cartwright, R. A., and Wood, D. J.
The flavonols of tea.
J. Sci. Food Agric., 1956, **7**: 637-46, bibl. 24.

The flavonols quercetin-3-glucoside (isoquercitrin), kaempferol-3-glucoside (astragalin), quercetin-3-rhamnoglucoside (rutin), kaempferol-3-rhamnoglucoside, quercetin-3-rhamnoglucoside, and kaempferol-3-rhamnodiglucoside, previously isolated and characterized in Japanese green teas, have also been detected in unprocessed tea-leaf and black tea from North East India. From the latter sources two glycosides of myricetin, tentatively identified as the 3-glucoside and 3-rhamnoglucoside, have also been isolated. [Authors' abstract.]—Indian Tea Ass. chem. Lab., Lond., and Tocklai exp. Stat., Assam.

Sundry crops.

(*See also* 671, 951c, g, k, l, n-p, s.)

947. Barrau, J.
Drier for preservation of bread fruit.
S. Pac. Commiss. quart. Bull., 1956, **6**(2): 16, illus., from *Trop. Abstr.*, 1956, **11**, No. d.1953.

Slices of breadfruit dried in a vegetable drier, developed in Ceylon and here briefly described, can be kept for several years in air-tight containers.

948. Turner, D. J.
Some observations on the germination and grading of cashew nuts.
E. Afr. agric. J., 1956, **22**: 35-9, bibl. 2.

A sample of unselected cashew nuts was separated into 5 density grades, and a study made of the relationship of density to germination behaviour and to output of kernels after roasting. Nuts of greater density germinated more quickly than nuts of lower density. Total viability was generally greater with grades of higher specific gravity. Very large nuts were all of relatively low density, and their viability and rate of germination were poor. Output of roasted kernels from grades of higher density was significantly better than from grades of lower density. The percentage of sound kernels progressively increased with increasing specific gravity. [From author's summary.]

949. Lizer y Trelles, C. A.
Ensayos para la destrucción de la *Fidicina mannifera* chicharra de la yerba maté. **(Trials on the destruction of *Fidicina mannifera,* cicada of yerba maté.** [English summary 5 lines.]
Bol. Fac. Agron. Vet. B. Aires **32**, 1956, pp. 13, bibl. 9, illus.

Soil treatment with chlordane, lindane, heptachlor, Folidol (E 605), Metasystox and Isolan (urethane) was ineffective in controlling the larvae. Carbon disulphide was more effective as an emulsion than in gaseous form. The best results were given by liquid methyl bromide at 25–50 c.c. per tree, poured into 5 narrow holes 10 cm. deep and 30 cm. from the trunk. Measures against the adult cicadas in summer are essential; the use of helicopters is suggested.

Noted.

950.

a Anon.
Pineapples. How and when pineapples are planted.
Fmg S. Afr., 1956, **32**(5): 47-50, illus.
Planting season, treatment of planting material and spacing.

b Anon.
Rendements obtenus en plantation par utilisation de graines d'*Élaeis* selectionnées à Yangambi et issues du croisement "dura" ×"pisifera". **(Plantation yields obtained by using selected oil palm seeds from Yangambi resulting from crossing *dura* with *pisifera*.)**
Bull. Inf. I.N.É.A.C., 1956, **5**: 271-2.

c Bartolome, R., and Tolentino, L. J.
The raising of crops under old coconut groves.
Philipp. J. Agric., 1954 (issued 1956), **19**: 161-71, bibl. 7, illus.
Including perennial crops now being tested experimentally.

d Bhagavan, H. N., and Rajagopalan, R.
Amino acid make-up of banana.
Curr. Sci., 1956, **25**: 223, bibl. 13.
In fruits of *Musa cavendishii*, *M. sapientum*, and *M. balbisiana.*

e Brimblecombe, A. R.
The pineapple scale in Queensland.
Qd agric. J., 1956, **82**: 217-18, illus.
For a more detailed account see *H.A.*, 26: 3156.

f Carangal, A. R., Jr., Catambay, A. M., Manzanilla, E. B.
Paper chromatography of plant proteins.
Philipp. Agric., 1955, **39**: 1-16, bibl. 14, illus.
Including proteins of coconut meat and papaw and *Ficus* latices.

g Carangal, A. R., Jr., and Tucay, E.
The occurrence of acetic acid in sugar-cane leaves.
Philipp. Agric., 1955, **39**: 181-4, bibl. 9.
In amounts of 0·71 to 1·91% D.M.

h Crénin, C., and d'Auzac, J.
Les phénomènes d'oxydo-réduction au sein du latex centrifugé et leur rapport avec son oxydation. **(Oxidation-reduction effects and their influence on the evolution of centrifuged latices.)**
Rev. gén. Caoutch., 1956, **33**: 801-4 (French), 818-20 (English), bibl. 6.

i Crowdy, S. H., and Elias, R. S.
Cacao diseases.
Outlook on Agric., 1956, **1**: 64-9, illus.
Problems of control reviewed.

j Dobrowolski, M.
La culture du cocotier sur la côte nord-ouest de Madagascar. **(Coconut growing on the northwest coast of Madagascar.)**
Oléagineux, 1956, **11**: 527-38, bibl. 2, illus.
Varieties, selection, management of nurseries and plantations, manuring, harvesting and yields.

k Douglas, J. W. E. H. S.
The uses of hydroponics in coffee growing.
Indian Coffee, 1956, **20**: 161-4, 179, bibl. 5, illus.
For raising seedlings and cuttings.

l Dutta, S. K.
Methods of uprooting and replanting [tea] with short term green crop rotations.
Two and a Bud, 1956, **3**(1): 8-10.

m Evers, E.
Matériel de plantation préconisé en hévéaculture au Congo belge. **(Planting material recommended for rubber cultivation in the Belgian Congo.)**
Bull. Inf. I.N.É.A.C., 1956, **5**: 215-18.
Seedlings, clones and rootstocks for new areas.

n Ferrand, M., and Santolaya, H.
La production d'huile de palme en Guinée espagnole. **(The production of palm oil in Spanish Guinea.)**
Oléagineux, 1956, **11**: 733-5.
Climate, culture, production and prospects.

o Glover, P. M.
Manuring with special reference to the use of mixtures containing nitrogen, phosphate and potash.
Two and a Bud, 1956, **3**(1): 3-5.
Recommendations on manuring tea, based on results of Tocklai trials.

p GRANER, E. A., AND GODOY, C., JR.
Formação de cafèzais em terras cultivadas. **(Formation of coffee plantations on cultivated land.)**
Bol. Super. Serv. Café, S. Paulo, 1955, **30**(340): 12-20, bibl. 13, illus.
Methods of establishment used in Brazil.

q GREGORY, P. J.
Coconut diseases in Travancore-Cochin State and measures proposed to combat them.
Bull. Indian centr. Coconut Cttee, 1956, **10**: 3-8, illus.

r GUILBEAU, W. F., COLL, E. E., AND MARTIN, L. F.
Processing characteristics of three recently released sugarcanes.
Sugar J., 1956, **19**(2): 37-40, bibl. 1.
C. P. 48–103, C. P. 47–193, and N: Co. 310 compared favourably with the standard C. P. 44–101.

s HARLER, C. R.
Tea soils and their management.
World Crops, 1956, **8**: 389-92, illus.
Different countries compared.

t HAUCK, F. W.
Potash as a manure for the coconut palm.
Planter, Kuala Lumpur, 1956, **32**: 373-83, bibl. 14.
Experience in India and Ceylon reviewed.

u JEPSON, W. F.
Methods of plant protection for peasants in the tropics.
Outlook on Agric., 1956, **1**: 59-63, bibl. 6.
Difficulties and possible remedies discussed.

v JULIANO, B. O.
Aconitic acid content of sugar cane juice and leaves and cane final molasses.
Philipp. Agric., 1955, **39**: 402-7, bibl. 8.

w KEEGEL, E. L., AND GUNARATNAM, S. M.
Interim report on the performance of the "Shizuoka" electric separator.
Tea Quart., 1956, **27**: 42-4, illus.
Favourable report on machine for separating stalks from tea.

x KING, N. J.
The varietal factor in cyclone damage.
Cane Grs' quart. Bull., 1956, **20**: 11-12, illus.
Pindar badly damaged, but Q.57, Q.59 and Q.44 resistant.

y LAÍNS E SILVA, H.
Programa de selecção de café Robusta em Angola. **(Programme of robusta coffee selection in Angola.)** [English summary 1 p.]
Rev. Café portug., 1956, 3(9): 7-24, bibl. 35.

z LOCSIN, C. L., TABAYOYONG, F. T., AND LACSON, M. V.
VMC experiment No. 207 plant ('54) and ratoon ('55) crops on furrowing and fertilization.
Sugar News, 1956, **32**: 236-42.
Furrowing and P and K treatments gave no significant differences.

951.

a LOCSIN, C. L., TABAYOYONG, F. T., AND LACSON, M. V.
VMC Expt. No. 239 ('55). Variety and fertilizer tests (6×4 factorial).
Sugar News, 1956, **32**: 290-5.
With 6 varieties the best yields and profits resulted from a 140–120–240 fertilizer.

b MARIOTTI, A.
La production du thé à l'Île Maurice. **(Tea production in Mauritius.)** [English and Spanish summaries ½ p. each.]
Agron. trop., 1956, **11**: 513-23.

c MATHUR, R. S.
Guava diseases in India.
Indian J. Hort., 1956, **13**: 26-9, bibl. 24.
A review.

d MENDES DA PONTE, A.
O percevejo do cafeeiro *Antestiopsis lineaticollis* Stal. (Coffee bug, punnaise du caféier.) **(The coffee bug, *Antestiopsis lineaticollis*.)**
Rev. Café portug., 1956, 3(9): 51-60, bibl. 24, illus.
A review of biology and control.

e MENON, K. P. V., AND NIRULA, K. K.
Aerial spraying of coconut palms.
Bull. Indian centr. Coconut Cttee, 1955, **10**: 9-11, 15.
Possibilities discussed.

f MESQUITELA, J. C.
Determinações do custo da produção do café numa propriedade de tipo médio em Angola. **(Determining the cost of production on an average coffee estate in Angola.)**
Rev. Café portug., 1956, 3(9): 25-43.

g MUKHERJEE, S. K.
Variations in cashewnut (*Anacardium occidentale* Linn.).
Indian J. Hort., 1956, **13**: 12-14, bibl. 1, illus.
Six types recognized on basis of apple and nut characters.

h NIRULA, K. K., RADHA, K., AND MENON, K. P. V.
The green muscardine disease of *Oryctes rhinoceros* L. I. Symptomatology, epizootology and economic importance.
Indian Coconut J., 1955, **9**: 3-10, bibl. 17, illus.
Biological control with *Metarrhizium anisopliae* has met with some success.

i NORTH-COOMBES, F.
Impressions de l'industrie sucrière indienne. **(Impressions of the Indian sugar industry.)**
Rev. agric. sucr. Maurice, 1956, **35**: 123-30, map.

j OBORDO, R. A.
The use of machinery in the production of sugar cane.
Philipp. Agric., 1954, **38**: 484-90, bibl. 5 [received 1956].
An economic study on mechanized cultivation.

k PAUL, V. J., AND YEDDANAPALLI, L. M.
On the olefinic nature of anacardic acid from Indian cashew nut shell liquid.
J. Amer. Chem. Soc., 1956, **78**: 5675-8, bibl. 11.

l PETERS, F. E., AND WILLS, P. A.
Dried breadfruit.
Nature, 1956, **178**: 1252, bibl. 1.
Composition of dried and fresh breadfruit compared.

m PUTTARUDRIAH, M., USMAN, S., AND SASTRY, K. S. S.
Some preliminary observations on the leaf-yellowing of sugarcane in the V.C. tract.
Mysore agric. J., 1956, **31**: 127-9.
Transmitted through setts, but cause not yet known.

n RAGHAVAN, V., AND BARUAH, H. K.
On arecanut and its scope.
Sci. and Cult., 1956, **22**: 150-3, bibl. 16.
Biology of the palm, fruit composition, pests, diseases and products.

o RIECKEHOFF, I. G., AND RÍOS, A.
Occurrence of pectin methylesterase in guavas. [Spanish summary 5 lines.]
J. Agric. Univ. P.R., 1956, **40**: 90-2, bibl. 6.
Notably in the peel of ripe fruits.

p ROBERTS, E. A. H.
The chlorogenic acids of tea and maté.
Chem. Ind. Lond., 1956, No. 37, pp. 985-6, bibl. 4.
Small amounts in tea leaf and much more in maté.

q ROCCHETTI, G.
Attività connesse in Somalia alla bananicoltura industriale. **(Activities in Somaliland connected with the banana industry.)**
Riv. Agric. subtrop., 1956, **50**: 311-25, illus.
Including methods of packing and shipping.

r ROUILLARD, G.
L'emploi de l'azote dans la culture de la canne à sucre à l'Île Maurice. **(The use of nitrogen for sugar cane in Mauritius.)**
Rev. agric. sucr. Maurice, 1956, **35**: 139-44.
A summary of numerous experiments.

s SANTINI, R., JR., AND HUYKE, A. S.
Identification of sugars present in fruit of the acerola (*Malpighia punicifolia* L.) by paper chromatography. [Spanish summary 3 lines.]
J. Agric. Univ. P.R., 1956, **40**: 87-9, bibl. 6.
Dextrose, levulose and sucrose.

t SEN, B. C.
Inter-cropping in gardens of West Bengal.
Bull. Indian centr. Coconut Cttee, 1956, **10**: 43-4, illus.
Growing arrowroot under coconuts.

u SHUKLA, K. C., AND ROY, R. S.
Varietal studies of bananas under Bihar conditions.
Indian J. Hort., 1956, **13**: 1-11, bibl. 23, illus.
Descriptions of 20 dessert and culinary varieties.

v SIMMONDS, N. W.
A banana collecting expedition to South East Asia and the Pacific.
Trop. Agriculture, Trin., 1956, **33**: 251-71, bibl. 5, illus.
Useful new breeding material, especially of *Musa acuminata*, obtained.

w DE SORNAY, A.
Nouvelles variétés de canne. **(New varieties of sugar cane.)**
Rev: agric. sucr. Maurice, 1956, **35**: 118-22.
Agronomic characters of B.34104, M.147/44 and M.31/45.

x VON STRENGE, H.
Wild coffee in Kaffa province of Ethiopia.
Trop. Agriculture, Trin., 1956, **33**: 297-301, translated from article in *Dtsch. Kulturpioner*, 1955, **56**.
Coffea arabica, wild and crudely cultivated.

y U.S. DEPARTMENT OF AGRICULTURE.
Cocoa beans. World production and trade.
Circ. U.S. Dep. Agric. Foreign agric. Serv. FCB **1-56**, 1956, pp. 24.
Including notes on development and improvement programmes.

z VEIGA, F. M.
Ratoon stunting disease in Brazil.
Cane Grs' quart. Bull., 1956, **20**: 3-6, illus.
Yield response of 6 varieties differed markedly.

952.

a VENKATARAMANI, K. S.
Notes on some common crotalarias. IV. *Crotalaria usaramoensis.*
Plant. Chron., 1956, **51**: 378-80, illus.
Description, green matter yields, diseases and pests.

b WANG, S.-C., YANG, C.-C., AND CHENG, S.-Y.
Fertilizer requirement of four main green manure plants on a sandstone alluvial soil. [Chinese, with English summary 2 pp.]
Rep. Taiwan Sugar Exp. Stat., 1955, No. 13, pp. 44-62, bibl. 8.
Used in sugar cane rotations.

c WEBSTER, B. N., AND PARK, P. O.
Developments in blister blight control. I. Introduction to the 1955 series of blister blight control experiments.
Tea Quart., 1956, **27**: 3-6, bibl. 5.
Including method of assessing incidence. [See also abstracts 940–942.]

d WHEATLEY, S. M.
The mangoes of the Kenya coast.
E. Afr. agric. J., 1956, **22**: 46-54, bibl. 5.
Variety descriptions with key, and notes on propagation and cultivation.

e WIGHT, W.
Economic life and death of Assam tea gardens.
Two and a Bud, 1956, 3(1): 6-7.
Discussed with reference to the effects of jat and crop rotation.

NOTES ON BOOKS AND REPORTS.

Books.

953. Anderson, H. W.
Diseases of fruit crops.
McGraw-Hill Book Company, New York, Toronto and London, 1956, 9×6 in., pp. 501, bibls., illus., 64s. or $8.50.

This is a sister-work from the U.S.A. to Wormald's "Diseases of Fruits and Hops", but whereas the latter is designed primarily to provide the fruit-grower with a key to the diagnosis of his orchard diseases, the present work by a well known practitioner in this field, less lavishly illustrated, is obviously written for the student of plant pathology and the trained advisory plant-pathologist, and as such, after due allowance is made for the fact that the work primarily refers to the American scene, provides an excellent introduction and work of reference to the hardy fruit-crop diseases. The bulk of the work deals with the parasitic and functional diseases of these crops and to the former are added disorders due to the parasitic nematodes.

An excellent introductory survey of the background of this subject in general plant pathology is followed by twelve chapters dealing with the major diseases, themselves arranged under the natural groupings of the host-fruits, namely diseases of Pome fruits (4), Drupe or Stone fruits (2), Brambles, Grapes, Strawberries, Gooseberries and Currants, Cranberries and Blueberries. Each of these sections is prefaced by an excellent introduction to the relevant host-fruit crops themselves, and the diseases are then dealt with individually under such headings as History, Geographic distribution, Economic importance, Causal organisms (host-range and morphology), Disease cycle, Relations to environment, and Control, each concluding with an author-list of selected references on the particular disease. An excellent index, invaluable for general reference, concludes the book.

Inevitably the sections dealing with the individual diseases are unequal in their completeness. The author sometimes seems to be unaware of important recent advances in our research knowledge of a particular disease, and in other cases is right up to date. These are minor criticisms, however, of an excellent text book which can be confidently recommended to students of plant pathology, advisory officers and others interested in the disorders of temperate fruits. R.V.H.

954. Andrews, F. W.
The flowering plants of the Sudan. Vol. III (Compositae-Gramineae).
Published for the Sudan Government by T. Buncle and Co., Ltd., Arbroath, Scotland, 1956, 8½×5½ in., pp. 579, illus., 21s.

The arrangement of the families, genera and species in this third and last volume of the flora follows lines similar to those adopted in the two earlier volumes [*H.A.*, 20: 3391 and 23: 2370]. Among the families most prominently represented are the Compositae, Solanaceae, Scrophulariaceae, Acanthaceae, Verbenaceae, Labiatae, Liliaceae, Orchidaceae, Cyperaceae and Gramineae. There are 145 figures and an index of botanical names.

955. Beaumont, A.
Diseases of garden plants.
Collingridge, London, 1956, 9½×5½ in., pp. 152, illus., 25s.

Emphasis has been placed on diseases of ornamentals, but chapters on potato, vegetable, fruit and lawn diseases are also included, and thus the average general gardener should be well satisfied. The plants in each group are arranged alphabetically and notes provided on the symptoms caused by different diseases with up-to-date information on the control of each. The photographs vary in usefulness. E.M.J.N.

956. Chase, J. L. H., and Pouncy, A. J.
Soil block gardening.
Faber and Faber, London, 1955, 9×5½ in., pp. 139, illus., 15s.

According to the authors soil blocks, as a substitute for clay pots, were first used in this country shortly after the first world war, but it is only during the last 10 years that they have attracted the serious attention of propagators. The technique of making and using them is therefore still in the experimental stage, and it is admitted that this book should be regarded " not as a manual but as a starting point in acquiring new knowledge". Nevertheless the authors have raised a wide range of vegetable and flower crops in blocks, and their experience of the various methods and treatments will be a most valuable guide to both the amateur and commercial gardener.

The most important factor in soil block making is the type and texture of the compost used, and this is discussed in considerable detail. There is also a most useful chapter on the various types of block-making machine available, giving descriptions of, and comments on, 7 amateur and 8 commercial models, many of which are illustrated. Although 2 Chase models are included in the list, the opportunity to advertise has been commendably avoided. Guidance is given on the relative merits of square, hexagonal and cylindrical blocks, and of solid blocks, formed round the plant, or cavity blocks in which the seed is sown or the plant pricked out after the cavity has been filled with suitable compost. Interesting possibilities include the use of solid blocks for striking cuttings and cavity blocks for rooting strawberry runners. The relative costs of raising plants in soil blocks and clay pots are compared.

The last half of the book deals with the way in which soil blocks can be used for various types of vegetable and flower crops. So far their chief commercial use has been for raising tomato plants, but experiments with cucumbers, lettuces, cauliflowers, chrysanthemums and dahlias, to mention only a few, have shown how the range can profitably be extended. The evidence presented here shows that soil block gardening is a system to be taken seriously, and many commercial growers, especially nurserymen raising plants for the retail trade, may well be convinced that it has an important future. Even if they are not persuaded to invest in a block-making machine, they will be grateful to the authors for having collated the results and experience so far available and for having presented the possibilities of this system fairly and critically.

P.R-D.

957. Cobley, L. S.
An introduction to the botany of tropical crops.
Longmans, Green and Co., London, 1956, 9×6 in., pp. xv+357, bibls., illus., 37s. 6d.

The classification round which this book has been planned is utilization, and the crop plants, grouped as grains, fibres, oil-crops, etc., are described seriatim in order of importance. Most of the botanical parallels are therefore obscured, though for many purposes the book is in consequence much handier to use. The index refers to about 400 tropical crop plants, and of these some 100 receive more than a brief mention ensuring a good coverage of all but the most petty crops. The botany consists of a cursory description of the plant with details of floral anatomy and the crop part, often illustrated by clear diagrams and excellent plates. Each chapter ends with a list of references, usually monographs, up to 1954. There is virtually no mention of breeding and physiology (possibly considered outside the scope of the book) nor of histology (possibly considered outside the scope of available equipment), though, surely, these should have been included for at least the most important crops. The information is largely derivative, and like such a book's predecessors, the Herbals, fact and generalization are intermingled in schoolmasterly manner in what are presumably expanded lecture notes. Minor mistakes are therefore common—to give some examples from one crop—the oil palm fruits on Fig. 35 are drawn upside-down with embryos and diagnostic fibres omitted; the export of the crop began long before 1842 —James Welsh in 1589 brought home "pepper, elephants teeth, oyle of palme, cloth made of cotton wooll very curiously wove etc." and went back for more in 1590 and 1591; most of the palms in *cultivation* today belong to dura and tenera varieties, not Macrocarya and Dura.

Agricultural botany is not generally conducive to a racy style of writing, but here it is quite readable, despite a cyclic tendency to revert to previous topics. There are also illogicalities such as "Thus a rainfall of at least 60″ is required, although in parts of the West Indies crops of cane grow well on less than this." Nevertheless, considering the enormous field to be covered, and the diffuseness of the source material, the author has done well to provide such a handy book for students with some knowledge of botany who are beginning a study of tropical crops. Used as a reference book, it would be adequate to ring a bell or give a further reference. It should also stand as a challenge for the new schools of Tropical Agriculture to do better for their own regions.

D.H.M.

958. Comar, C. L.
Radioisotopes in biology and agriculture.
McGraw-Hill Book Company, New York, Toronto, London, 1955, 9×6 in., pp. xiii+481, bibls extensive, illus., $9.00 or 67s. 6d.

This is the most important book yet published in the special field of the application of the new "tracer" techniques to biological research and as such should be read and kept at hand by all workers in these methods. It begins with a lucid and succinct account of the basic principles of tracer methodology, but without becoming involved in complications of nuclear physics, and with illustrations drawn from a wide variety of biological and pedological fields. A large section of this first chapter is devoted to the kinetic analyses of the processes, involving calculations of decay curves and phase transfer problems. Chapter 2 deals with the basic difficulties likely to be met in using these methods, especially those of radioactive impurities, radiation effects on plant and animal tissues, exchange reactions and the so-called "isotope effect", the influence upon reactions of the presence of radioactive atoms or of an abnormal mixture of stable isotopes.

The next two chapters are concerned with the problems of protection from radiation hazards and the equipment and methods for handling radioisotopes. Chapter 5 gives an admirably clear and detailed account of the more important methods for radioassay. While the author does not attempt to describe all the procedures which have been employed, the standard techniques are given in sufficient detail for a worker to be able to use them without reference to original papers. A section describing and illustrating the construction of the different types of Geiger tubes might usefully have been added.

Chapter 6 accounts for over one quarter of the whole book and gives detailed information on the properties of, and procedures for, individual radioisotopes and will prove of immense value as a reference text. This is the section which will, of course, most often need revision to bring it up to date as new data and methods for the various isotopes are discovered. Availability and prices of materials are based on the catalogue of the American Oak Ridge National Laboratory, but most, if not all, are also likely to be available from the British centre at Amersham.

Chapter 7 is a critical account of the methods of autoradiography accompanied by some very striking photographs illustrating the value of this technique in tracing the distribution of labelled substances in tissues. Chapters 8 and 9 are valuable accounts of the associated techniques of paper chromatography and ion exchange separation. These chapters are of value to all workers in these fields as they give detailed procedures, not only for the study of radioactive materials, but also for normal substances. The final chapter gives an account of the novel method of radioactivation analysis in which the sample to be analysed is placed in a flux of bombarding particles and, after elimination of radio-contaminants, the induced radioactivity of the particular element determined, thus giving a measure of the amount of the original sample.

The book, though not in the usual McGraw-Hill format, is well up to the expected standard in paper, printing and preparation of its indexes.

R.H.S.

959. Cox, E. H. M., and Cox, P. A.
Modern rhododendrons.
Thomas Nelson & Son, London, 1956, 9×6 in., pp. 193, illus., 21s.

Rhododendron amateurs will welcome this book, for with the exception of the *Rhododendron Handbook*, bewildering with its list of over 750 species, works on the genus are few, scarce, prohibitively expensive and, in the light of current taxonomical juggling, out of date. In *Modern Rhododendrons* the recommendations are

comprehensive but choosey, with the emphasis on species rather than hybrids and confined to plants which the reader has some chance of obtaining. The most important chapter, the yolk in the egg, so to speak, which occupies the greater part of the book, describes, in alphabetical order and often with line drawings, the many series and sub-series into which the genus is being provisionally divided; a work which began about 1904 and shows every sign of extending to infinity. There is a chapter on azaleas. Cultivation, propagation, pests and diseases receive adequate attention. The book closes with 12 lists each of 12 species and hybrids, grouped for size, habit, suitability for various situations, and so on. The four quite beautiful coloured plates by Miss Margaret Stones, who also did the line drawings, deserve special mention.
G.St.C.F.

960. DORF, P.
Liberty Hyde Bailey.
Cornell Univ. Press, Ithaca, and Oxford Univ. Press, London, 1956, 9×6 in., pp. 259, $3.50 or 28s.

The author describes this work as "a review for the general reader of a great American's life story, his background, personality and achievements".

It does not pretend to be a detailed analysis of his scientific contributions, though many of them cannot be excluded from any book purporting to outline Bailey's life. To the average English-speaking horticulturist perhaps his most outstanding contribution to horticulture were the various Cyclopaedias of Horticulture for which he was responsible. These still hold their own with any in the field. Yet despite his publications, which probably run into several hundreds, his greatest achievement surely lay in raising the standard of horticultural learning and education throughout the world, chiefly by his domination of the scene at Cornell for 25 years in the heyday of his life from 1888 to 1913. Aged 55 he retired then from a life of organizing the student to an even more strenuous one of horticultural investigation and discovery, which brought renown to American horticulture and enlightenment to horticulturists everywhere. On his 90th birthday he was in the West Indian jungle searching for rare plants and palms. He returned to give a sparkling account of his tour at the postponed birthday party. Two years later he was all set for a study of palms in Nigeria and an advisory visit to the Belgian Congo, where, as everywhere, his advice was still in demand. But a stumble just before he was about to start resulted in a bad accident and complete recovery was denied him. He died in his 97th year. This inspiring and gracious small book is worth reading.
D.A.

961. FERNÁNDEZ DE BOBADILLA, G.
Viniferas jerezanas y de Andalucía occidental. **(Vinifera varieties of the Jerez region and of western Andalusia.)**
[*Publ.*] *Inst. nac. Invest. agron., Madrid,* 1956, 9½×6½ in., pp. 271, illus.

Detailed ampelographic descriptions and illustrations are given of 30 wine and table varieties of the region. Factors affecting changes in the popularity of certain varieties are discussed.

962. FRIEDRICH, G. (EDITOR).
Der Obstbau. **(Fruit growing.)**
Neumann Verlag, Radebeul, 1956, 10×7 in., pp. 736, bibl. [classified] pp. 12, illus., DM. ???.

This large, solid tome compiled by the leading pomologists of Eastern Germany at Halle, Marquardt, Pillnitz and Leipzig is slightly reminiscent of such earlier American manuals as *Fundamentals of Fruit Production*, in that it affords information, not only on individual practical problems of fruit growing, but also on the scientific theory and knowledge on which good practice is based. Thus the authors first consider in detail the anatomy, physiology and chemistry of the fruit plant before turning to the general problems of choice of rootstock, of pruning and of training. Environment, and in particular, as one might expect, frost incidence, receives its full share of attention. Separate sections concern planting schemes, the utilization of unfavourable sites, soil management, manuring, interculture, and soil sickness. Irrigation gets only brief mention. Picking, grading and packing are dealt with and also storage, with the emphasis on cold or cellar stores but with little on gas storage. Some thirty pages are devoted to plant protection measures and materials. Management questions including costing and accounts are discussed in some detail. Probably the part that is likely to be of the most practical value to the English-speaking pomologist will be the 100 pages devoted to descriptions of the chief varieties of top and small fruits grown in Eastern Germany with notes on their pollination needs and with attractive coloured plates of many apples and pears. Many of these varieties are already known elsewhere and others are perhaps worth knowing. Briefly it seems to this reviewer that the average Anglo-Saxon fruit grower—if there be such a person—will naturally hesitate to buy good advice in a strange tongue, but the worker in his research station, suffering despite, or possibly because of, his early training from equal or even greater linguistic incapacity than the grower, will nevertheless be only too glad to thumb his way through relevant sections of this modern, comprehensive reference work in his Institute's library, where undoubtedly it should find an honourable place.
D.A.

963. GARDNER, C. A., AND BENNETTS, H. W.
The toxic plants of Western Australia.
West Australian Newspapers Ltd., Perth, 1956, 10½×7½ in., pp. 253, bibl. 142, illus., 50s. Aust.

This book is noticeable for its clear and large print, for the clarity of its line figures and the beauty of its colour prints. Its wealth of information has been made possible by 30 years' work by the authors, a botanist, Mr. Gardner, and a no less distinguished veterinary expert, Mr. Bennetts.

In it the authors make plain, not less to the farmer than to the scientist, those plants which may be causing damage and destruction to livestock on a large scale. In the introduction, toxicity in plants is defined, and the toxic principles and the plant and animal factors influencing them are discussed. Cyanogenetic plants and plants causing photosensitivity receive special mention.

In the text proper the particular plants, grouped in their different families and with their common and scientific names, are considered separately, and notes are given on the symptoms of poisoning caused by each plant, on postmortem appearances and on other references in the literature to such plants. Very many of the plants are illustrated in detail by line drawings and there are 52 coloured plates, mainly of *Oxylobium* and *Gastrolobium* spp. Further, in appendixes the authors note for Western Australia the distribution of these plants, the cyanogenetic plants found, plants causing photosensitivity, plants causing skin troubles, plants causing hay fever, and the indications in stock of poisoning by the specific toxic plants discussed. A short simple glossary of botanical and veterinary terms is helpful and one is grateful for an index. D.A.

964. Gault, S. M.
Vegetables for garden and exhibition.
Collingridge, Lond., 1956, 10×6 in., pp. 268, illus., 50s.

This book is written primarily for the private gardener by a practical man of great experience. In the first 69 pages preliminary measures are dealt with such as the use of tools, soil management, manuring, rotation and different types of cropping; further, diseases and pests, the art of exhibition and a monthly calendar of work in the English vegetable garden are considered. Then in succession all the vegetables commonly grown in Britain receive individual attention and a few useful notes are included on common herbs. The illustrations, both photographic and line, are decorative and helpful. Finally, in Appendix A details are provided on spacing and on sowing, planting and harvesting, and in Appendix B are given the tables accepted for judging purposes at exhibitions. The reader is not indeed told why, but he certainly is told what to do, and he will undoubtedly be thankful. The book is well printed and easy to read. D.A.

965. Halliday, D. J.
The manuring of sugar cane. [French and German summaries each 5 pp.]
Centre d'Étude de l'Azote, 42 Rue du Rhône, Geneva, 1956, 10½×8 in., pp. 221, bibl. 22 pp., illus.

During the past 30 years or so a formidable amount of research has been carried out on the manurial requirements and responses of sugar cane, and it is probably true to say that it is largely owing to the striking results achieved that in many countries today sugar research teams form an integral and respected part of the sugar industry's structure. The earlier work, based largely on field trials, showed clearly that, given sufficient water, cane would usually respond most handsomely to liberal fertilizing, especially with nitrogen. In the past decade investigations on the use of plant analysis have pointed the way to regulating applications of fertilizers and water in a more precise, and therefore less wasteful, manner than has yet proved possible with any other crop. Despite this progress there is still an immense gap between the more advanced and the more backward cane-growing areas in the extent to which the knowledge so far gained has been applied. It would therefore seem an opportune moment to produce a book in which advances in fertilizing practice and research are reviewed on a world-wide basis.

Mr. Halliday introduces his subject by summarizing briefly the historical background, the present distribution and production of sugar cane and the main features of its cultivation and nutrient requirements. He then considers each of the more important cane growing countries in turn, outlining their main geographical and soil features, their current fertilizer practices and the results of fertilizer experiments and of work on plant analysis. Considering that he has done this with an absolute minimum of padding the text is surprisingly readable and the information provided on the results of innumerable experiments is easy to follow. This should make the book of value to planters and estate managers, as well as to research workers, and the latter are also provided with a comprehensive and really up-to-date bibliography, from which to glean more detailed information.

This is a well produced publication, lavishly illustrated. It is true that hardly any of the pictures has a bearing on the subject, but it may be that there are many people, who, like the reviewer, derive a certain nostalgic pleasure from looking at pictures of tropical crops growing in the far corners of the earth. G.K.A.

966. Harler, C. R.
The culture and marketing of tea.
Oxford University Press, London, 2nd edition, 1956, 8½×5½ in., pp. 256, 25s.

Comprehensive literature concerning the cultivation and manufacture of tea is not only scanty but out of date, and the new edition of Mr. Harler's book published in 1933 [*H.A.*, 4: 306] fills a long-felt need. It is no exaggeration to say that scientific research, spurred on by sheer economic necessity, has completely revolutionized all aspects of tea production in the last decade or so, and in this survey of some of the recent developments, the author has drawn freely on the publications of the Research Institutes of the principal countries concerned; these findings are presented in a way that makes the book not only instructive but interesting, though it is scarcely surprising that the recommendations of the Tocklai Research Station in Assam, where the author worked for many years, receive rather more than their due share of attention.

The future of the Tea Industry, at least in countries like India and Ceylon where land hunger is acute, is becoming more and more dependent on increasing the yield potential of new plantings, since much of the older tea in those countries is by now worn out and uneconomic. This aspect is fully discussed in the first part of this book, under sections dealing with the vegetative reproduction of selected high yielding bushes and with the selection of high yielding seed; in connection with the latter, a description is given of the work in progress at Tocklai, where a method of classification of tea bushes into agrotypes has been evolved as a basis for the long term breeding programme. A considerable section is also devoted to information on factory technique and the biochemical processes involved in tea manufacture.

In the second part of the book the historical development of the tea plantation industry is traced in all the established and potentially important tea producing countries of the world, and extensive details are given of the methods of cultivation and manufacture adopted in different countries, with special reference to North

India and Ceylon. Of the various cultivation techniques evolved in Assam to suit the particular soil and climatic factors there, undoubtedly the one likely to have the widest application concerns the use of leguminous shade trees (*Albizzia* spp.); the unique series of experiments on this subject laid out at Tocklai in 1940 have, in fact, shown that the combined effects of the shade and the leaf fall from a normal stand of *Albizzia* are equivalent to the annual addition of 80–100 lb. N per acre given as sulphate of ammonia.

The third part of the book deals with the development of tea marketing, and an analysis is given of the imports and exports of tea in the major consuming and producing countries of the world; in the latter category perhaps the most significant is the scale of development now proceeding in East Africa.

The cultivation and manufacture of tea on well-managed estates have now reached a high pitch of efficiency as a result of scientific research, and yields per acre have shown enormous increases in recent years; however, one of the more important conclusions reached by the author is that the industry as a whole cannot derive the fullest benefits of this progress until some really effective means is found of controlling the periodical slumps and booms which continue to have a disturbing effect on the industry.

T.W.

967. HEEGER, E. F.
Handbuch des Arznei- und Gewürzpflanzenbaues. **(Manual on the cultivation of drug and spice plants.)**
Deutscher Bauernverlag, Berlin W 8, 1956, 10×7 in., pp. 775, bibl. very numerous, illus. 430, DM. 45.

It was originally planned to issue this book in three volumes and to deal, not only with cultivation of the plants and their preparation for drug extraction, but with their actual processing and with their medicinal and other pharmaceutical properties and uses. The subject matter, less that which concerns processing and uses, has been compressed and is now issued in one compact volume.

The result should be of great use to those who propose to cultivate drug plants or promote their cultivation. In the first part, pp. 1-206, the author deals with general aspects such as the importance of such culture in agriculture, environmental conditions preferable, centres of production, choice of sorts and varieties, rotations, manuring and soil management, sowing, planting and general management, harvesting, drying, storage and transport, standardization of products, development of wild species, aims of breeding, secondary uses and the possible use of essentially ordinary plants as a source of drugs.

In the second part 89 species are considered in great detail and with useful illustrations, mainly photographic. Generally speaking information is given for each plant on the following: The part of the plant used, its commercial designation and botanical name, its botanical features, soil and climate, origin and distribution through the world, chief districts or countries where it is obtainable, varieties used and their origin, seed characters, cultivation from seed to harvest, harvesting and yields, pests and diseases.

Numerous references are given as footnotes throughout and in addition the short bibliography at the end should be useful to those wanting to keep abreast of the subject. The addresses of more than 70 firms, institutes or societies interested in different aspects of drug production, mainly but not entirely in [Eastern] Germany, show how important drug production is there. The work is well printed and is in simple understandable German.

D.A.

968. HOPKINS, J. C. F.
Tobacco diseases.
Commonw. mycol. Inst., 1956, 9½×6 in., pp. 178, bibl. 5 pp., illus., 35s. or $4.90.

The full title of this book is *Tobacco diseases with special reference to Africa*, and in his introduction the author describes it as being essentially an up-to-date and enlarged edition of the departmental handbook, *Diseases of tobacco in Southern Rhodesia*, published in that country in 1931. The aim has been to cover all the diseases and disorders of tobacco recorded in Africa and in adjacent islands, and to do this in such a way as to make the book of practical value to the planter and extension officer as well as to the plant pathologist. Thus, although technical information resulting from research work in Rhodesia, the Union and elsewhere is recorded, particular emphasis is laid on those conditions and practices in seed-bed, plantation and curing barn, which have been shown by wide experience to affect the incidence and control of diseases.

Following a short introductory account of the nature of plant diseases, the various aspects of seed-bed preparation, seed cleaning and disinfection, spraying and dusting seed-beds and field hygiene are dealt with in some detail. The greater part of the book, however, is devoted to individual diseases and their control, grouped under the following headings: Diseases in seed-beds, parasitic diseases in the field, miscellaneous diseases and disorders (ranging from physiological and nutritional upsets to such accidents as lightning injury), and, finally, diseases of curing.

The many excellent illustrations, some in colour, are a notable feature of the work, which should be available to everyone concerned with the growing or protection of that very disease-prone plant, tobacco.

G.K.A.

969. JENSMA, J. R.
Cabbage varieties—Sluitkoolrassen.
Instituut voor de Veredeling van Tuinbouwgewassen, Wageningen, 1956, 10×8 in., pp. 150, illus., fl. 13.50.

Details are given in English and Dutch for 69 cabbage varieties of origin, synonyms, uses [in Holland], morphology and references. Many of them are known and used by English growers. Each variety is displayed in large, clear photographs, both as a whole and cut in half. The aim is to provide the seed grower with a guide, which may help him to keep his varieties true to type, and to afford advisory officers and research workers an insight into the varietal material available. Cabbages are classified into 3 types, viz. White, Savoy and Red, the White and Savoy being further differentiated as conical, globular, and flat or drumhead. There are 9 red varieties.

D.A.

970. KANTOROVIČ, A.
The Timirjazev Academy. [Russian.]
Gosudarstvennoe Izdatel'stvo kul't.-prosv. Lit., Moscow, 1955, 9×7 in., pp. 317, illus., 8.60 roubles.

The Timirjazev Academy of Agriculture founded at Moscow in 1865 is the leading institute for advanced agricultural training in the Soviet Union. It comprises 6 faculties, of which fruit and vegetable growing forms one, and gives courses for agricultural specialists who have already qualified. This book relates the history of the Academy, mentions research workers and staff who have become prominent in the Russian agricultural world and outlines the work of the various departments. The reader is conducted through the fields and trial plots of the experimental stations, the gardens, museums, laboratories, orangeries, glasshouses and plant collections of the institute. Special emphasis is laid on the new and valuable contributions that have been made to the Soviet economy.

971. KEEGEL, E. L.
Tea manufacture in Ceylon.
Monogr. Tea Res. Inst. Ceylon, **4**, 1956, 9½×6 in., pp. 163, bibl. 5 pp., illus., free to subscribers to "The Tea Quarterly", otherwise Rs. 5/–.

During the past 24 years investigations on the manufacture of black tea, as generally practised in Ceylon, has formed an important part of the work of the Tea Research Institute at St. Coombs. The aim of this monograph is to place on record the knowledge acquired from experimental and advisory work and to provide the most up-to-date information on the various processes of manufacture. Technicalities have been avoided as far as possible and the emphasis throughout is on practical aspects and innovations which are likely to be of particular value to the tea planter. The bibliography, classified according to subjects, records all the papers on tea manufacture issued by the Institute between 1928 and 1955, and there is also a detailed subject index.

972. LEVITT, J.
The hardiness of plants.
Academic Press Inc., New York, 1956, 9×6 in., pp. 278, bibl. 933, illus., 57s. 3d.

This well-documented book is of fundamental importance to those studying methods of frost protection. It is divided into three parts which concern low temperature hardiness, low moisture hardiness and high temperature hardiness. Among subjects considered in part I are the phenomena associated with freezing injury, the measurement of frost hardiness, the relation of hardiness to growth, to cell sap concentration, to morphological factors, to protoplasmic properties and the mechanism of frost injury and hardiness. Forty pages are devoted to similar discussion on drought hardiness and thirty-three to high temperature hardiness. Such a reappraisal of the subjects was long overdue and will be greatly appreciated. D.A.

973. MCLEAN, R. C., AND IVIMEY-COOK, W. R.
Textbook of theoretical botany. Vol. II.
Longmans, Green & Co., London, New York and Toronto, 1956, 10×6 in., pp. xiii+1,131, illus., 90s.

This volume is one of a series of four which follows the publication in 1952 of *Textbook of Practical Botany* [*H.A.*, 23: 1379] by the same authors and doubtless derives its rather unfortunate title from the need of distinction from that predecessor. Volume I was concerned with all the plant phyla below the Angiospermae. Volume III will deal with palaeobotany, alternation of generations and evolution of sex in plants, evolutionary theories, heredity and genetics, and plant physiology. The final volume will cover bionomics, ecology, plant geography, plant pathology, physiology of fungi and bacteria, and economic botany. The present volume, except for its final chapter on the classification of plants as a whole, is entirely devoted to the Angiospermae. The presentation of the subject matter is extremely lucid and factual, avoiding all undue reference to conflicting theoretical arguments [and in this, as in other fields of botany, they are legion!]. A detailed study of floral morphology and ontogeny is followed by chapters on pollination, sexual reproduction, seeds, fruits and seedlings, and systematics of dicotyledon and monocotyledon families. The numerous excellent line drawings and photographs are an outstanding feature and the only adverse criticism possible here is that for some of the photographic groups the captions leave the identity of the separate specimens in doubt to the unpractised eye. Another minor detraction is the repetition of sectional headings along page tops. The 530 pages headed "The Angiospermae" could have been given their 4 different chapters headings.

The inclusion of portraits of eminent botanists in the relevant sections of the text is a welcome departure from textbook tradition. There is no fear that the average first-year university student will be out of his depth and the authors have even tempered the wind of terminology to the modern lamb shorn of his classics, by including a most helpful glossary of prefixes and suffixes. The more advanced student will find the book an invaluable supplement to his lecture notes.
K.H.C.

974. OWEN, E. B., AND ASHTON, T.
The storage of seeds for maintenance of viability.
Bull. Bur. Pastures, Hurley, Maidenhead, **43**, 1956, 9½×7 in., pp. 81, bibl. 552, 20s.

This bulletin does not give practical instructions for storing seeds, but it gives details on the very numerous factors which influence successful storage and considers these in connection with the seeds of cultivated crops including many vegetables.

Factual evidence on the longevity of seeds is followed by a general discussion of factors affecting viability in store. The humidity of seeds and their environment is next considered and literature is quoted on the drying of seeds and on materials and methods adopted for accomplishing this. Useful comment is made on the changes which accompany loss of viability in stored seeds and on how dormancy and hardseededness affect the storage problem. A chapter is devoted to seed treatment with fungicides, insecticides and herbicides, etc., and in a final chapter the longevity and storage of seeds of particular cultivated plants are studied in rather more detail. Among these plants are hemp, vegetables in general, onion, lettuce, parsnip, New

Zealand spinach, beet, sugar cane, tobacco, strawberry, angelica and delphinium—a mixed but interesting bag. Finally a table is given of germination and viability observed by different authorities in some 100 cultivated species, including vegetables, under varying stated conditions of humidity, temperature and period of storage.

T. Ashton of the Plant Breeding Bureau at Cambridge deals with the genetical aspects.

975. Ruhland, W., and others (Editors).
Handbuch der Pflanzenphysiologie. **(Encyclopedia of plant physiology.)**
Springer-Verlag, Berlin, Göttingen and Heidelberg, Vol. I, 1955, 10×6½ in., pp. i-xx+850, bibls., illus.; Vol. II, 1956, 10×6½ in., pp. i-xxi+1,072, bibls., illus.; Vol. III, 1956, 10×6½ in., pp. i-xxii+1,073, bibls., illus. Prices, if subscribing to series, DM. 128, 158.40 and 198.40 or for separate volumes DM. 160, 198 and 248, respectively.

We should like to draw attention to the appearance of this new encyclopedic series on plant physiology, eventually to comprise 18 volumes grouped in 3 sections. General principles are covered in Vols. I and II, metabolism in Vols. III–XIII, and growth, development, movement, and reproduction in Vols. XIV–XVIII. The publication of supplementary volumes is envisaged, to keep pace with further advances in the subject. The contributors chosen are eminent European and American specialists, each providing one or more chapters with bibliographies. Volume I deals with heredity, physiological variability from the experimental standpoint, and cytology. Of its 27 chapters 17 are in English and the rest in German. Volume II is concerned entirely with the physiology of plant cells. It contains 30 chapters in German and 14 in English. Volume III covers the wide field of water relationships in plants and comprises 39 chapters in German, 11 in English and one in French.

976. Stapp, C. (Editors Appel, O., and Richter, H.).
Handbuch der Pflanzenkrankheiten, Band II. Lieferung 2. Bakterielle Krankheiten. **(Handbook of plant diseases. Vol. II, Sect. 2. Bacterial diseases.)**
Paul Parey, Berlin and Hamburg, 1956, 9½×6½ in., pp. 567, bibls. numerous, illus., DM. 124.

The last edition of Sorauer's *Handbuch der Pflanzenkrankheiten* containing Stapp's account of the bacterial plant diseases appeared in 1928, and since then considerable advances have taken place. On all diseases, including those regarded as classical even thirty years ago, a wealth of new information has been accumulated, and many new diseases have been described. At the same time a fuller and richer understanding of the natural affinities of the plant pathogenic bacteria has lead to radical changes in our ideas on the nomenclature and taxonomy of these organisms.

This sixth edition of the *Handbuch* (Vol. II, Sect. 2) brings up to date our knowledge of the bacterial plant diseases and their causal organisms and does so with that commendable thoroughness, which one is inclined to regard as the hall-mark of textbooks in German. The bacterial diseases have been regarded in the widest sense, and the book includes a short section of about fifty pages dealing with diseases caused by actinomycetes.

The individual diseases are arranged under host family headings, e.g. Rosaceae, Leguminosae, etc., and each account includes a description of the main characteristics of the causal organism and concludes with a comprehensive list of references, most of which, owing to American pre-eminence in this field, are in English. For the bacterial pathogens the compilers have followed the nomenclature used in the sixth edition of Bergey's *Manual* and have thus set the seal on the now almost universal acceptance of this system by plant bacteriologists.

This well illustrated and beautifully produced book is claimed to be a treatise unequalled in any other publication. This is a plain understatement, for in its exhaustive treatment of the bacterial diseases as such it is obviously unique. It would be a great pity if it failed to reach a wider circle of readers for lack of an English translation. J.E.C.

977. Tritton, S. M.
Amateur wine making.
Faber & Faber, London, 1956, 9×5½ in., pp. 239, illus., 21s.

The sub-title does not hide its light under a bushel but runs "An introduction and complete guide to wine, cider, perry, mead and beer making and to the cultivation of the vine." One likes particularly "and to the cultivation of the vine" almost thrown in as an afterthought. The only other adverse comment which the squeamish might be inclined to make is that the picture opposite page 48 is enough to put one off the delights of port drinking for good. However, having surmounted those hurdles our would-be English oenologist will have no further cause for complaint either on the score of quantity or quality of information. By the time, moreover, that he has mastered the principles on which winemaking is based, has decided whether to plump for dry white wine or dry red wine, or sweet dessert wine or sparkling wine or sherry or port wine or even for herb, cereal or vegetable wine, when further he has tested the many varieties of vine recommended and has found one to suit his conditions, he will be very thirsty and he surely will not be over troubled if his first attempts do not closely resemble a Steinberger Riesling from the Rhine or a Fino La Ina from Spain. In brief this is an essentially practical book for the persevering amateur and is assuredly the most comprehensive one as yet available to the English grower. Finally, the author tells you where to get your vines, and the various implements, containers and yeasts necessary for winemaking—points too often omitted from books of this kind. It is a cheap guinea's worth. D.A.

978. Wain, R. L., and Wightman, F. (Editors).
The chemistry and mode of action of plant growth substances.
Butterworths Scientific Publications, London, and Academic Press, New York, 1956, 10×6½ in., pp. xi+312, bibls. numerous, illus., 55s.+2s. postage.

The fourth major conference on plant growth substances was held in England at Wye College during July, 1955, with more than sixty participants from seven countries. Earlier conferences were in France (Paris, 1937), the U.S.A. (Wisconsin, 1949) and Sweden (Lund, 1953), but as the proceedings of the most recent of these were published only in abstract form the present record assumes an enhanced significance. The book is well produced and the editors must be congratulated on the rapidity of publication.

Twenty-six papers were read grouped as follows: I Natural auxins, 7 papers; II Chemical structure and biological activity, 10 papers; III Metabolism and mode of action, 7 papers; IV Application of kinetics to auxin-induced growth, 2 papers. To refer to each paper individually would render this review tedious and in making a selection the aim is to convey something of the trends of research and in no way implies that the contributions not discussed were less worthy.

In section I the emphasis of J. P. Nitsch contrasts with that made by S. A. Gordon. Nitsch pleads the case for knowing the nature of all the auxins that occur in plants before attempting to understand their mode of regulation. In forthright manner he discusses the techniques of achieving this, the requirements being "a reliable extraction method, a good chromatographic technique, and a suitable bio-assay", i.e. collection, separation and measurement. The tool of paper chromatography has given renewed impetus to all auxin studies, because by physical separation of different substances, not only has precise resolution been made between growth-promoting and growth-inhibiting activity, but also the idea of distinct auxins and inhibitors has seemed to complicate interpretation. It is therefore most refreshing to read Gordon's paper on auxin biogenesis, which emphasizes the structural similarity between such natural auxins as ethylindoleacetate, indoleacetonitrile, indoleacetaldehyde and indolepyruvic acid and indoleacetic acid (IAA), and suggests that "the native auxin of hormonal function in the plant is IAA", to which other auxinic substances must be converted before activity is manifest. The various pathways of biosynthesis and interconversion are still to be fully explored, some being normal to many plants, others being more specifically characteristic.

Four other papers in the first section describe detailed studies of natural hormones in various plant parts and all illustrate the new complexities. The remaining paper by P. Larson is rather out of character and proves to be an apologia for the classical auxin theory of geotropism.

The chemical approach to the study of hormonal substances is to relate biological activity to chemical structure, synthesizing the many variants of any given molecular type and testing their physiological activity on the plant. The ramifications of such studies are legion, and their intricacy is apparent from the various papers in the second section of the book. No one, perhaps, has pursued these enquiries further than H. Veldstra, and it is significant that in this paper "On form and function of plant growth substances" he advocates a shift of emphasis away from the structure of the stimulating substance towards the elucidation of the nature of the response in the cell.

In some degree this has been done by F. C. Steward and E. M. Shantz in investigations of chemical stimulation of growth in tissue culture, for in their paper they contrast the response of rapidly dividing cells with that of non-growing or resting cells. But the deeper significance of this contribution is the venture beyond the boundary of auxin action, with its characteristic influence on cell-enlargement, into the complementary field of cell-division hormones. Both these processes may occur together with balanced regulation, but either may be induced to the exclusion of the other, IAA inducing cell-enlargement, other substances such as those found in coconut milk inducing cell-division.

Among the papers of Section III the penetrating analysis by A. W. Galston of "Some metabolic consequences of the administration of indoleacetic acid to plant cells" is further recognition of the principal role played by IAA in the plant, and throws much light on its mode of action. Most added IAA is enzymatically destroyed by an oxidase, the small fraction forming a protein complex being protected by such inactivation. Roots which are much more sensitive to auxin than stems have much the higher oxidase activity, but in roots and stems alike it is the actively extending regions which display the lowest activity of the enzyme. Galston sees the oxidase system as a growth-regulating mechanism, auxin level itself being the controller of the enzyme formation. Furthermore, the peroxidase activity of tissue in the region of cell elongation is also stimulated by IAA treatment, not in the pith, cortex or epidermis, but in xylem and phloem, the seat of subsequent lignification. By the induced formation of a lignin-synthesizing peroxidase there is in fact an auxin mechanism for promoting the process of lignification.

In a different approach L. J. Audus and R. Thresh follow the effect of different synthetic compounds on the levels of endogenous auxin, on the supposition that the synthetic growth regulator may operate by disturbing natural auxin rather than in a more direct fashion. They found that 2,4-D has no detectable effect; that maleic hydrazide though having limited influence must inhibit growth in other ways; and that tri-iodobenzoic acid (TIBA) causes sharp falls in IAA level, which could account for its own stimulating effect on flower formation. The authors rightly point to the difficulties of interpreting fully their observations.

Both J. Bonner and T. A. Bennet-Clark provide papers on the mode of action of auxin, in particular in relation to water uptake and cell extension. The conclusion in each case is that the cell-wall itself is the key factor, Bonner showing that auxin treatment lowers cell-wall pressure, Bennet-Clark that there is an interference with pectin in the cell-wall.

These last two authors also contribute the two papers in the final section of the book dealing with a specialized approach to the problem of auxin-induced growth. How far the methods of enzyme kinetics can be applied to this problem may be a controversial question and to those who were present at the discussions these final papers will revive memories of lively argument. It is a good place for the book to end, with the study of auxin still in full swing, the complexities of the growth process in the plant undeniably appreciated, and the critical battle area narrowed once again to a cell stimulated to extend by the substance which F. W. Went assayed thirty years ago. E.S.J.H.

979. Wallace, T., and Bush, R. G. W. (Editors).
Modern commercial fruit growing.
Collingwood, London, 1956, 10×7½ in., pp. 384, illus., £5 5s.

This excellently produced book consists of well-illustrated essays on fruit growing by recognized authorities, the majority of whom are past or present members of staff of the Long Ashton Research Station. Part one comprises chapters on climate and site, soils, nutrition, planting material, fungicides and insecticides, machinery and the development of a fruit growing project. Part two deals with the culture of tree fruits through all its stages including varieties and rootstocks, planting systems, pruning, soil management, pest control, harvesting, marketing and storage. Part three discusses the culture of soft fruits with chapters devoted to bush fruits, cane fruits and strawberries. Part four covers special subjects, breeding, new varieties, virus diseases, and growth regulators.

The fact that the information is presented as signed contributions will probably make it more acceptable to fruit growers than the impersonal pronouncements in the official bulletins, but it must be pointed out that these same bulletins of the British Ministry of Agriculture, Fisheries and Food have reached a high standard in presenting the latest information on commercial fruit growing at very low cost. They are compiled and revised by the members of the Fruit Group of the National Agricultural Service, under the Chairmanship of Professor T. Wallace, with assistance from research workers and other specialists in various fields. One cannot help wondering, therefore, whether a five-guinea book covering much the same ground is really necessary. Still it does contain chapters which are particularly valuable as giving information not readily available to fruit growers from other sources, namely Chapter VI on insecticides and fungicides (H. Martin), Chapter XVI on storage (J. C. Fidler), Chapter XX on breeding (M. B. Crane), and Chapter XXIV on plant growth regulators (L. C. Luckwill).

The combination of Wallace and Bush as editors has ensured accurate presentation in an essentially readable form; one expects perfection and is rarely let down. The actual cost of items of machinery, orchard operations, etc., are given in several places but these figures are of little value at a time when costs are rising daily unless qualified by the date when they were valid. In fact costs are rising so rapidly nowadays that some of the figures given are already too low at the time of publication. In the description of the new apple rootstocks M.XXV is wrongly described as one of the original Malling rootstocks and no mention is made of its vigour grouping. Most of the illustrations are excellent, but a few were obviously posed by the photographer giving unrealistic impressions of operations, such as harvesting apples (p. 217) and grading plums (p. 218).

The book is well indexed and contains a few references to other reading. It should prove a valuable library addition but its price puts it into the luxury class of books that few individuals can afford to possess.

H.B.S.M.

980. Wilde, S. A., and Voigt, G. K.
Analysis of soils and plants for foresters and horticulturists.
J. W. Edwards, Publisher, Inc., Ann Arbor, Michigan, 1955, 8½×5½ in., pp. 117, bibls., illus., $3.75.

This book is dedicated to Professor Emil Truog, a pioneer in methods of soil analysis. It is concerned with methods used to analyse soil problems involved in the production of forest plants and is divided into seven parts or chapters. The first two consider the physical and chemical characters of the soil, the third deals with ground water, the fourth is concerned with microbiological aspects of soils, the fifth describes the vegetative cover, the sixth discusses the chemical analysis of plant tissues, and the seventh deals with nursery stock.

The title of this book is misleading, as it is not clear whether the authors expect foresters and horticulturists to carry out the complicated physical and chemical tests described in the text or whether they are instructing the specialist in soil chemistry and biology. Should the former be true then it is likely that this book is too technical; should the latter be the aim then there is insufficient critical appraisal of the methods chosen and of the reproducibility of the results.

In part II, "Analysis of Chemical Characteristics of Soils", the section on trace elements in soils is woefully inadequate; methods for determining manganese and boron only are given, and no mention is made of the use of microbiological methods, developed over the last five years, for determining copper, zinc, manganese and molybdenum in soils. Statements such as "iron functions are similar to other trace elements" are vague and misleading. Again, in part VI, in discussing the wet ashing of plant material, no word of caution is given about the use of perchloric acid, which is highly dangerous when added without adequate amounts of nitric or sulphuric acids, nor is there any mention of the use of rapid tissue tests for determining the mineral status of crops.

Some of the figures in the text could have been omitted, e.g. figs. 23, 36 and 39, as they add nothing to it. It is unfortunate that little mention is made of European work, a common failing in current American writing. Proof reading has not been very thorough as shown by the errata sheet included with the book.

As the authors point out "this book is a pioneering effort" and they "will appreciate suggestions in regard to improvements of the text". This book will undoubtedly improve in subsequent editions as the authors have already collated much useful information for those interested in soil problems involved in the production of woody plants. D.J.D.N.

Annuals and reports.

981. Asociación peruana de Ingenieros Agrónomos.
Anales del II° Congreso Nacional de Ingenieros Agrónomos. **(Annals of the 2nd [Peruvian] National Congress of Agricultural Scientists.)** Lima, 1952, pp 868, illus. [received 1956].

The proceedings of the congress celebrating the jubilee of the association include papers on: *Section of food* *production:* Mango varieties; banana products (dried); bean varieties. *Section of industrial crops:* Sugar cane varieties and breeding, maturation, irrigation, manuring. *Section of irrigation and soils:* Compost production and utilization for cabbage; guano; balanced nutrition of crops. *Forestry section:* Cultivation of *Lonchocarpus utilis* for the production of insecticides; possibilities of sugar cane growing in the forest zone. *Section of agricultural experimentation:* Insect pest control.

982. Becker, G. [Editor].
Berichte und Vorträge der Deutschen Akademie der Landwirtschaftswissenschaften zu Berlin. 2. Festsitzung und wissenschaftliche Tagung 17.–19. Oktober 1955 in Berlin. **(Reports and Papers of the German Academy of Agricultural Sciences in Berlin. 2nd Meeting and Scientific Conference 17-19 October, 1955)**, 1956, pp. 272, bibls.

The meeting was concerned with quality in agricultural produce and included papers on breeding for quality and quality in vegetables and fruits.

983. California.
Thirty-sixth Annual Report of the State of California Department of Agriculture, period ending December 31, 1955.
Bull. Calif. Dep. Agric., 1956, **45**: 35-216, illus.

The bulletin contains reports on agricultural administration and includes that of the Plant Industry Division, which covers surveys and the eradication of pests and diseases, regulations on the use of agricultural chemicals, and the inspection of seeds, fertilizers and pesticides.

984. Ceylon (Joachim, A. W. R.).
Administration Report of the Director of Agriculture for 1955, Part IV—Education, Science and Art (C), 1956, pp. 136, Rs. 2.40 +35 cents postage.

This report includes information on the following, among other, research activities: *Tea Research Institute:* Tea soil survey, high-temperature withering, comparative trials of clones, eelworms and other pests. *Rubber Research Institute:* Selection of both high-yielding and disease-resistant clones for the rehabilitation of the industry, soil conservation, disease control, smoke houses, latex studies, nutrition. *Coconut Research Institute:* Planting, breeding, manuring, soil surveys, trace elements, sand culture of seedlings, rhinoceros beetle control, vinegar production from toddy by a new process, a copra kiln for small holders. *Division of Botany:* Selection of areca palms, varietal trials with citronella and vegetable crops, onion manuring, chilli varieties. *Division of Sugarcane Research:* Breeding, variety trials, time of ratooning, manuring. *Division of Chemistry:* Leaf composition and manuring of tobacco, bitter principle in rubber honey, curing of white pepper, preservation of rambutans (*Nephelium lappaceum*) and plantains, papain studies. *Division of Entomology:* Chemical control of the following pests: *Helopeltis antonii* on cacao, leaf hopper (*Idiocerus clypealis*) on mangoes, mealybug on pineapples, aphids on tobacco, the thrips and mite vectors of chilli leaf-curl; biological control of coconut caterpillar by *Trichospilus pupivora* and of orienta fruit fly by *Opius* spp. *Division of Horticulture* A mixture of equal parts of coir dust and paddy husk as a rooting medium for cacao cuttings, cacao selection for high yields, storage of cacao beans in polythene bags; citrus manuring, citrus rootstock-scion relationships; improvement of rambutan by budding and top working; papaw varieties for papain production *Tobacco Division:* Varieties, extension of tobacco growing.

985. Commonwealth Scientific and Industrial Research Organization, Australia.
Seventh Annual Report C.S.I.R.O. for the year ending 30th June, 1955, Canberra, 1955, pp. 185, 11s.

Among the headings in this report are: *Plants:* microbiology: fruit investigations [see separate abstract] oil crops; tobacco investigation [see separate abstract] nutrition; toxicology; physiology; biochemistry. *Irrigation:* at Merbein and Griffith [see separate abstract] *Entomology:* biological control; insecticide investigations. *Food:* physics; chemistry; fresh fruit and vegetable storage and transport; canning and fruit products dehydrated foods; frozen fruits and vegetables; wine dried vine fruits. *Plant fibres:* agricultural investigations; processing and utilization; fundamental fibre investigations. *Atmospheric physics:* frost prevention cloud and rain physics.

986. Directie van de Landbouw, 's-Gravenhage.
Tuinbouwkundig Onderzoek, Jaarverslag 1955. **(Horticultural Research, Annual Report 1955.)**
Ministry of Agriculture, The Hague, 1956, pp. 479, illus.

In an introductory note it is stated that "This report is a brief outline of the most important results of horticultural research in the Netherlands during 1955. The objective is mainly to stimulate co-operation between research workers and to avoid any overlap of work. The report is classified according to subjects and has a provisional character. Therefore, reproduction of the contents in part or in full is only permitted after obtaining the written permission of the Director of Horticulture." The subjects are classified under the following headings: general, fruits, vegetables, flowers, bulbs, nursery, herbs and tobacco, seeds and bees.

987. D.S.I.R., London.
Food Investigation 1955, being ***Report of the Food Investigation Board*** with the ***Report of the Director of Food Investigation for the year 1955,*** H.M. Stationery Office, London, 1956, pp. 76, 4s.

Accounts are given of work at the Low Temperature Research Station, Cambridge, at Ditton Laboratory, nr. Maidstone, and at Covent Garden Laboratory. Investigations include: The biochemistry of apple fruits; the storage of apples and pears, including conditions for storage, superficial scald, volatile compounds produced by apples, effects of cultural conditions on chemical composition and storage life, and lenticel rotting of apples; the storage and transport of soft fruits, stone fruits and vegetables (watercress and peas); storage engineering; the prediction of ripening in bananas by measuring their hardness; gummosis of plums; and dehydration of vegetables.

988. FAO.
Yearbook of Food and Agricultural Statistics, 1955, Vol. IX, Part 2, Trade.
[English, French, Spanish.] Rome, 1956, pp. 320, $3.50 or 17s. 6d.

Statistics are given for world agricultural trade for the calendar years 1952, 1953 and 1954. The products include: sugar, dry beans, onions, fruits (bananas, citrus, apples, pears, grapes, dates and coconuts), oil seeds (copra, palm kernels and castor beans), vegetable oils (olive oil, palm oil, palm kernel oil and castor oil), coffee, tea, cacao beans, pepper, hops, wines, tobacco, fibres and rubber.

989. FLORIDA.
Annual Report of Florida Agricultural Experiment Stations for the fiscal year ending June 30, 1955, pp. 356, illus.

Summaries are given of work in progress in each of the departmental and branch stations and field laboratories. Crops studied include citrus, vegetables (including tomatoes, melons and legumes), cut flowers and other ornamentals, tobacco, pecans, strawberries, and tung. The aspects studied include culture, nutrition, pests and diseases, processing, marketing and by-products.

990. HELLYER, A. G. L. (EDITOR).
Amateur Gardening Annual, 1957.
Amateur Gardening, Tavistock Street, London, W.C.2, 1956, pp. 140, 6s.

The amateur gardener is, as usual, well served with over 40 handsomely illustrated articles by as many well known authorities on flowers, trees and shrubs, fruits, vegetables, greenhouse plants and such ancillary subjects as mechanized gardening, electrically-heated propagating frames and horticultural philately.

991. INTERNATIONAL POTASH INSTITUTE.
Potassium symposium, 1955.
International Potash Institute, Berne, 1956, 9×6 in., pp. 613, bibls., illus.

The full text is given in the original language (English, French, German, Italian or Spanish) for each of 26 papers, with summaries in all 5 languages presented at the Annual Meeting held at Rome. The various sections cover: mineralogy and geology of potassium; forms of potassium in soils; potassium in soils of different climatic zones; Italian soils and potassium fertilizing. [Papers of horticultural interest have been abstracted separately.]

992. I.R.S.I.A.
Rapport annuel de l'Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture, Exercice 1955. **(Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture, 1955)**, Brussels, [1956], pp. 233.

The research programmes subsidized by the Institute are summarized in this administrative report. They include projects on plant growth substance, strawberries, medicinal plants, mushrooms, hops and vines.

993. MISSISSIPPI.
68th Annual Report of the Mississippi Agricultural Experiment Station for the fiscal year ending June 30, 1955, pp. 84, illus.

Horticulture: Breeding, selection and variety trials with vegetables, tree and small fruits and ornamentals. Cabbage: bolting may be reduced and head firmness increased by planting plants with a stem diameter no thicker than a pencil and by spraying with CIPP in early February. Peaches: continuous chilling at 39° F. was more effective than intermittent warm and cold periods in breaking the rest of leaf buds on the Sunhigh and Redhaven varieties. Fruit pest control: lead arsenate and DDT both injured peach foliage to some extent, but neither agrimycin nor terramycin injured apple foliage. Poinsettias: stock plants grown in the open produced as many cuttings as those grown in the greenhouse or cloth house. Chrysanthemums: reduced shade and wider spacing of potted plants resulted in more flowers and shorter stems. Vegetable seed storage: quick lime in combination with a desiccant had a beneficial effect on the storage of watermelon, pepper and tomato seed. *Plant Pathology and Plant Physiology:* Peppers: breeding for resistance to virus, nematodes and *Cercospora* leaf spot. Peas: a disease of winter peas caused by *Cercospora* sp. was reported for the first time. Peaches: captan and wettable sulphur gave outstanding control of scab and brown rot. Chrysanthemums: a complex of factors appears to be responsible for root rot disease. Weed control: excellent control of annual weeds in strawberries was obtained by 2 treatments with SES in April; in sugar cane a pre-emergence application of CMU at 2 lb./acre gave good early season weed control; in cucurbits 2 forms of N-1-naphthyl phthalamic acid at 3 lb./acre were satisfactory; control of wild onion, Johnson grass and nutgrass was studied. *Coastal Plain Branch Station:* Sugar cane variety test. Cucumber spacing and nitrogen requirements. *Delta Branch Station:* Spinach: good weed control has been obtained with DNBP, CMU, Karmex DL and Karmex DW, the first chemical giving the best yields and quality of spinach; nitrate of soda produced higher yields than ammonium forms of N. Vegetables: variety tests. *North Mississippi Branch Station:* Peaches: Redhaven and Triogem proved the hardiest varieties. *South Mississippi Branch Station:* Tomato variety tests. Sugar cane variety tests. Tung: a harvesting machine has been developed; breeding studies; good weed control in nurseries has been obtained with TCA at 80 lb./acre without serious injury to seedlings. *Truck Crops Branch Station:* Breeding and variety tests with vegetables. Fertilizer studies on snap and lima beans, tomatoes and bell peppers.

994. NEW ZEALAND, DEPARTMENT OF AGRICULTURE.
Annual Report of the Director-General of Agriculture for the year ended 31 March 1956, Wellington, 1956, pp. 178, 6s.

The report of the Horticulture Division covers pp. 76–108. Information is given on production figures, management, marketing, pests and diseases and other aspects of growing top and soft fruits, citrus and other sub-tropical fruits, vines, hops, tobacco, vegetables and ornamentals. Viticultural trials at Te

Kauwhata Horticultural Station included variety testing, soil management, disease and pest control, low-volume spraying and bench-grafting. Some progress is reported in the experimental work on small fruits and ornamentals carried out at Levin Horticultural Research Station, and vegetable trials in the Avondale Horticultural Trials Area are also mentioned.

995. D.S.I.R., New Zealand.
30th Annual Report of the Department of Scientific and Industrial Research, New Zealand, for 1955-56, Wellington, 1956, pp. 73, 3s.

A brief account is given of research during the past year on various crops, including deciduous and citrus fruits, hops and tobacco [see separate abstracts]. Work in progress includes: *Fruit Research Station:* Effects of hormones on tomato quality; parthenocarpic development of frosted apricots; pre-harvest drop of grapefruit; compatibility of thinning agents with other sprays; effect of chemical thinning on biennial bearing in apples; studies on cell size of thinned apple fruit; studies on natural auxin occurring in apple sap; effects of heavy top-dressings on apple yields and of urea on fruit set; effects of case liners on wilting of apples and pears in storage; testing an air-mixing machine for frost control; measurement of low temperatures dangerous to cherries and peaches; suppression of pear water shoots with maleic hydrazide; and sterilization of tree sites for replanting. *Hop Research:* Breeding, including the raising of polyploids; studies on cultural operations and drying conditions. *Plant Diseases Division:* Studies on pests and diseases of many horticultural crops; plant therapeutants; studies on effect of winter and summer pruning on incidence of silver leaf in peaches; studies on hot-water treatment and therapeutant applications for controlling chrysanthemum eelworm. *Tobacco Research:* Alternatives to steam sterilization for controlling weeds and disease in seedling beds; testing new insecticides and fungicides on seedlings; manurial, cultural and variety trials, breeding for disease resistance; curing. *Cawthron Institute:* Research on fruit, hops, tobacco and tomatoes.

996. Nyasaland.
Annual Report of the Department of Agriculture for the Year 1954/55 (Part II), pp. 73, 3s. 6d.

Coffee: Unshaded, mulched trees made better growth than those receiving other shade/mulch treatments; *Sesbania* was detrimental to coffee growth; shelterbelts of *Pinus patula, Cupressus lusitanica, Callitris calcarata* and *Grevillea robusta* are being tested. *Fruit:* The almond variety Britz flowered and set fruit satisfactorily; the most suitable peach varieties are subtropical (Chinese) freestones; suitable plum varieties include Santa Rosa, Satsuma and Burbank; in a granadilla fertilizer experiment split N applications at planting time and in late February produced a significant increase in crop; high yields were obtained from the guava variety Katete; spraying pineapples with NAA in April produced no increased crop over unsprayed plants. [See also separate abstracts on tea, tung and tobacco.]

997. Saanichton Dominion Experimental Farm.
Summary report 1955.
Publ. Saanichton Domin. exp. Fm **162**, 1956, pp. 25, illus.

Summaries are given of work on: *Strawberries:* The Holloway strain of Royal Sovereign shows excellent vigour in B.C.; in a greenhouse experiment fertilizer treatments which gave a good response were manure at 15 tons per acre, and an 80–360–50 fertilizer. *Apples:* The commercial properties of dwarf apple trees are being investigated. *Ornamentals:* Shading for flower production of outdoor chrysanthemums; heat curing of Wedgewood iris to minimize blindness and blasting; tulip varieties forced under incandescent light; dry-pack storage of cut daffodils; propagation and manuring of holly; heating saved by double glazing of greenhouses. *Chemical weed control* in bulbs and loganberries and around apple and pear trees. *Sawdust mulch* for cherries, strawberries, currants, gooseberries and holly and studies on N depression from sawdust incorporation. *Vegetables:* Pea, onion, cucumber and cabbage varieties; vernalization of hard-heading lettuce. *Special equipment:* Experimental plot sprayer; holly packaging machines; experimental portable shade or cloth houses; apple pulper.

998. Shell Company of Venezuela.
Servicio Shell para el Agricultor. Resumen de actividades, 1955. (**Shell Service for the Farmer. Summary of activities, 1955.**)
Compañía Shell de Venezuela, Cagua, Aragua, pp. 58, illus.

This report includes details of: *Vegetables:* Successful new varieties for wet and dry-season cultivation in Venezuela. *Cutworms:* Control by means of insecticidal sprays and baits. *Onions:* Weed control with potassium cyanate, CMU and chloro-IPC; control of fungus diseases and thrips by fungicide mixtures; insecticidal treatments for thrips. *Capsicums:* Control of fungal infections and weeds. *Melons:* Control of fruit moth (*Diaphania nitidalis*). *Citrus:* Control of orange moth (*Gimnandrosoma aurantianum*) and of aphids and purple scale (*Lepidosaphes beckii*). *Tobacco:* Control of white fly, boring weevil and other pests. *Coffee:* Control of mealybug; preliminary fertilizer trials. *Beans, tomatoes, carrots, bananas and sugar cane:* Weed control studies.

999. Tunisie, Service Botanique et Agronomique.
Rapport sur les Travaux de Recherche effectués en 1955. (**Report on research work conducted in Tunisia in 1955**), 1956, pp. 315 (cyclostyled).

Information summarized includes: *Market Garden Crops Laboratory:* Selection of tomatoes and introduction of new varieties of vegetables. *Agricultural Entomology Station:* Control of broad-bean aphids, and baits for *Ceratitis*. *Fruit-growing Laboratory:* Introduction of new varieties of almond, apricot, apple, peach, pear, plum and pomegranate, grafting of pistachio, hybridization of apricots and grafting of olives. *Agricultural Laboratory of the C[ollege] of A[griculture]:* Foliar diagnosis in olives. *Fruit-growing and Viticultural Laboratory of the C. of A.:* Tomato varieties, capsicum diseases, hybridization of vines, introduction of new vine varieties and hybrids, foliar diagnosis in orange. *Botanical Laboratory of the C. of A.:* Diseases of vegetables and fruit trees. *Olive Research Station:* Regeneration of olive groves, studies of olive soils, the establishment of a variety collection, and the manuring of olives. [See also separate abstracts.]

New periodicals.

1000. Facultad de Agronomía de la Universidad Nacional de Tucumán.
Revista Agronomia del Noroeste Argentino [*Rev. agron. noroeste Argent.*], 1956, Vol. II, No. 1, 9½×6½ in., pp. 244, illus., from Facultad de Agronomía, Casilla de Correo 125, San Miguel de Tucumán, Argentina.

This is the official organ of the Faculty of Agronomy at Tucumán, in which original scientific papers on all aspects of agriculture, including physiology and entomology, are published by members of the staff. The journal is well printed and presented. In this number there is no indication of the price or of the number of issues per year.

1001. Imperial Chemical Industries Ltd.
Outlook on Agriculture [*Outlook on Agric.*], 1956, Vol. 1, No. 1, pp. 40, illus., I.C.I. Ltd., Jealott's Hill Research Station, Bracknell, Berks.

The aims of this new journal are to review some of the fundamental problems of agriculture and to describe modern techniques for dealing with these problems. Its publication is sponsored by the agricultural organizations within I.C.I., and, in addition to technical articles, it includes abstracts and book reviews. To begin with 2 numbers are to be issued each year.

1002. Ministry of Agriculture, London.
Experimental Husbandry [*Exp. Husbandry*], 1956, No. 1, pp. 64, H.M. Stationery Office, London, 3s.

A major aim of this new periodical is to strengthen the links between research and practice by giving accounts of experiments carried out at the N.A.A.S. Experimental Husbandry Farms and on commercial farms in England and Wales, in which the practical aspects of such work will be emphasized. It is hoped, however, that the research worker and student, as well as the farmer and adviser, will find material of interest to them. The eight papers in the first number comprise five on field crops and one each on peas, cattle, and machinery.

Noted.

1003.

a Commercial Grower.
The Commercial Grower Year Book and Diary, 1957.
Benn Bros., Fleet Street, London, 1956, 8×6 in., pp. 252, 12s. 6d.
Much useful information as in the past [see *H.A.*, 25: 3387].

b Connecticut (Storrs).
Annual [sic] ***Report the Storrs Agricultural Experiment Station, Biennium ending June 30, 1955,*** being *Bull.* **327**, 1956, pp. 27.
A list of research projects on fruit, vegetables, flowers, etc.

c Edinburgh School of Agriculture.
Guide to field experiments, demonstrations and farm crops, 1956, pp. 76. Horticultural Department, pp. 25-6.

d Fiji.
Annual Report, 1954, Principal Agricultural Station, Department of Agriculture, Fiji, completing *Bull.* **29**, Suva, pp. 10.
Includes trials in progress on bananas and sugar cane.

e Gurr, E.
A practical manual of medical and biological staining techniques.
Leonard Hill, London, 2nd edition, 1956, 8½×5½ in., pp. 451, 42s.

f Minnesota.
62nd Annual Report Minnesota Agricultural Experiment Station 1954/55, pp. 52.
Projects listed.

g Mysore.
Administration and Progress of Work Report of the Chemical (and other) Sections of the Agricultural Department for the year 1947-48, 1954, pp. 103 [received 1956].
Among crops studied are sugar cane and many fruits (including use of *Ficus palmata* as a stock for figs).

h Nigeria.
Annual Report on the Department of Agriculture, Federation of Nigeria (Central) for the year 1953-54, Part I, [1956], pp. 8, 9d.
Crops mentioned briefly include cacao, rubber and pepper.

i Nyasaland.
Annual Report of the Nyasaland Department of Agriculture for the year 1955 (Part I), 1956, pp. 32, 2s. 6d.
For part II on experimental work see abstract 000.

j Washington State.
65th Annual Report of Washington Agricultural Experiment Stations, Institute of Agricultural Sciences, for 1954/55, 1955, pp. 56, being *Bull.* **563**.
Projects listed.